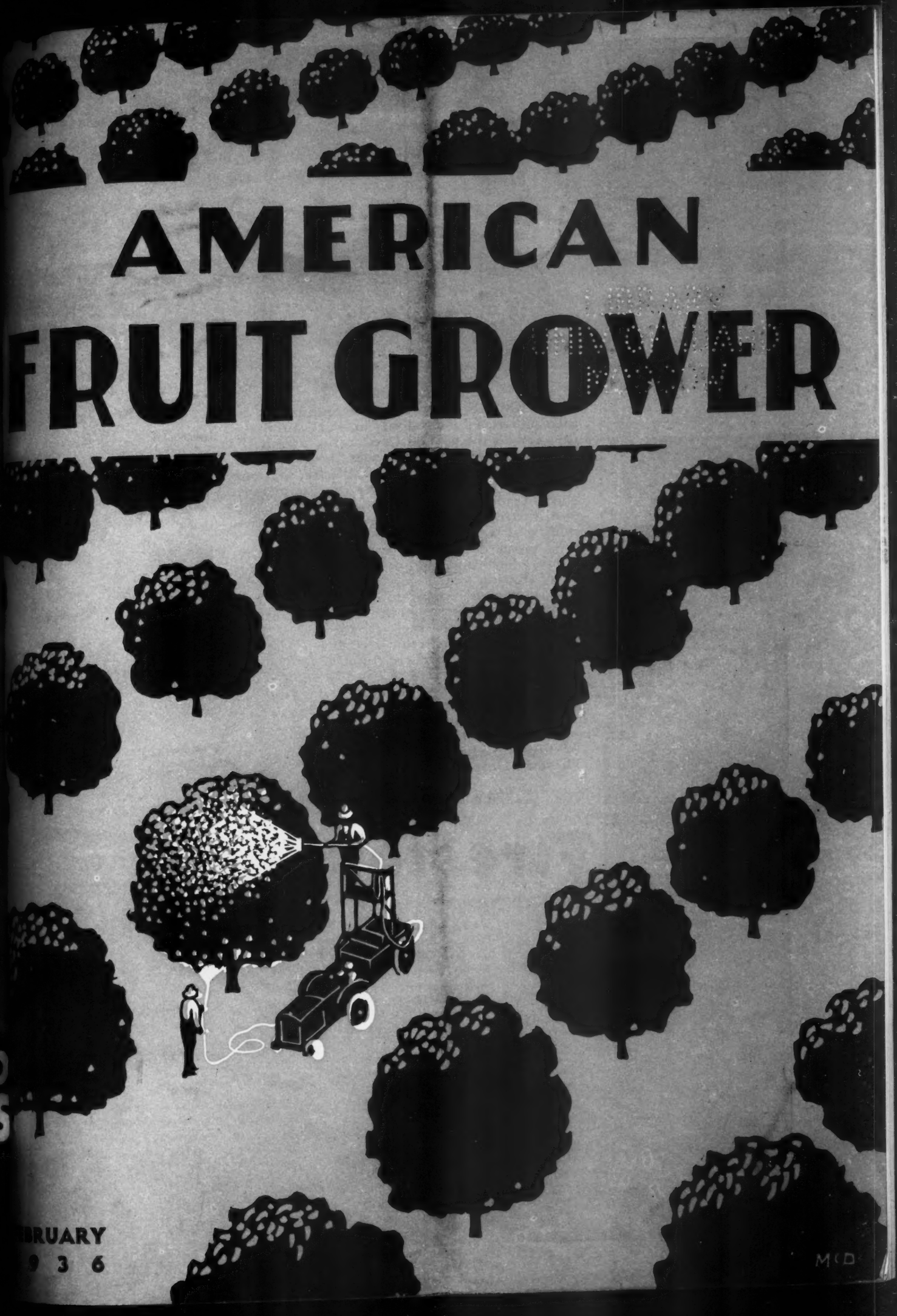
AMERICAN FRUIT GROWER



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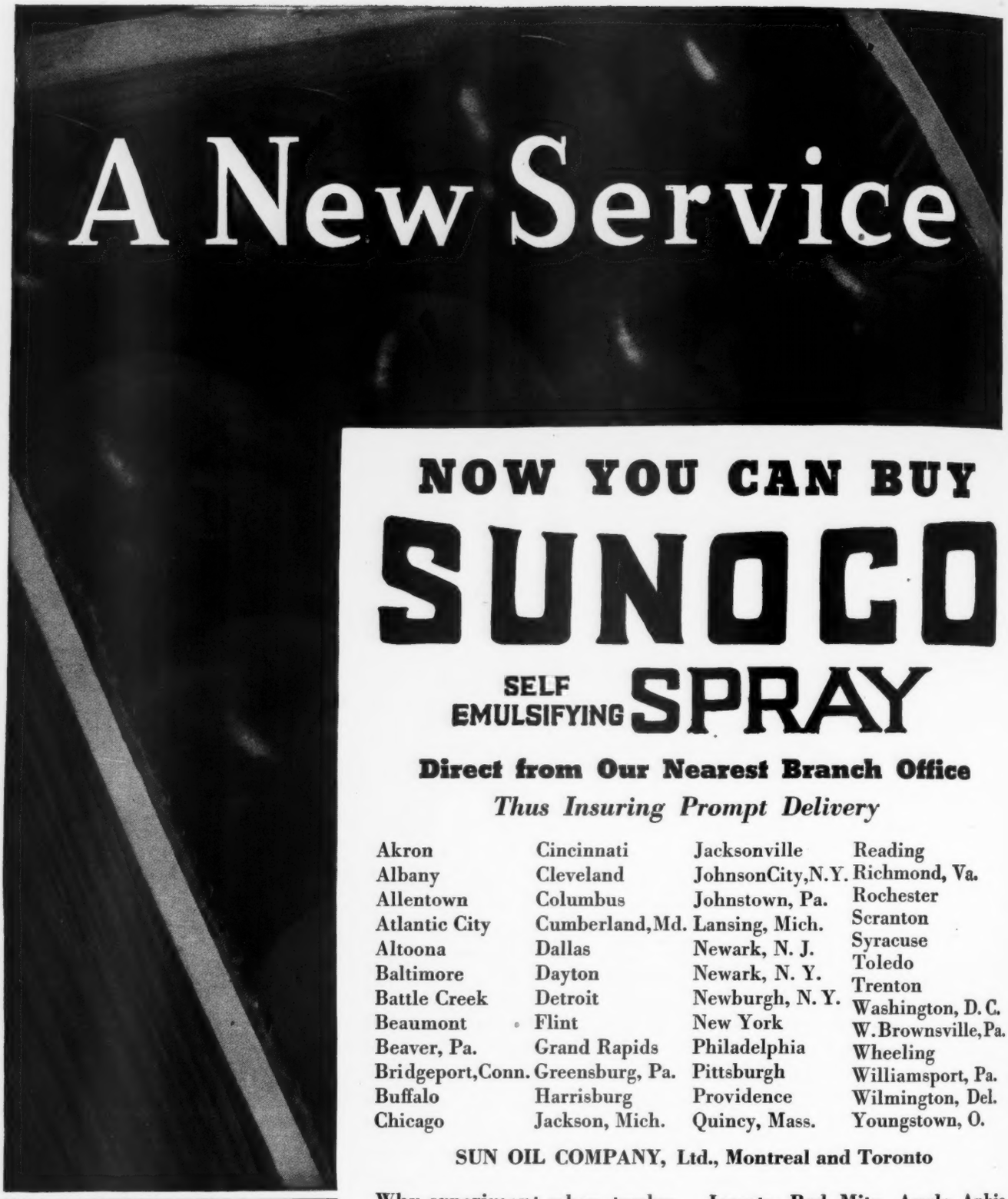

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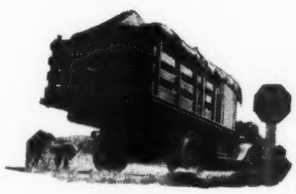

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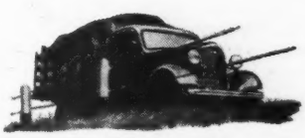

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It's ready. It will save you time, money and effort and make your implements do more work. . . . *You pay no more for this better tire.* And you can buy it on most liberal terms.

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AMERICAN FRUIT GROWER

TITLE REGISTERED IN U.S. PATENT OFFICE

FEBRUARY 1936

VOL. 56 • THE NATIONAL FRUIT MAGAZINE • NO. 2

"THEY SHALL NOT PASS"

AT the outbreak of the Great War, the world thrilled to the defiant cry, "They shall not pass," as the defending armies stood their ground, stiffened their lines and, finally, defeated the invaders almost at the very gates of Paris.

Today in the orchards of America this same, "They shall not pass," should be the battle cry of fruit growers, as with spray guns in hand, they stand armed and alert to repel the invasion of insect pests.

This cry should be one of intelligent defiance, and not of despair, for with the aid of science, modern equipment and the *will to do,* the battle can be won.

As in any other form of warfare, however, preparedness is of first importance. Better to be ready than to rail at fate because of the annual attacks of insect pests. Man's fight against his insect enemies is an old, old story. They plagued our forefathers, and their forefathers before them. The antiquity of insects is indicated by fossil impressions which show that insect life was already abundant during the Carboniferous age, which, according to estimates by geologists and physicists, was somewhere between 40,000,000 and 146,000,000 years ago.

The battle still goes on! But think of the advantages that you, as a modern fruit grower, now have—advantages that assure you of victory if you but avail yourself of them! In laboratories maintained by the federal government, by each state and by commercial enterprises, scientists are at work devising new and better spray materials, as well as methods of spraying. Practical tests are carried out under every possible condition, and exact data and instructions placed in your hands so you can cope with and overcome the enemy. More recently the radio, telephone and telegraph have been pressed into service, the better to keep you informed on when and with what to spray. No commanding general in his headquarters is kept more carefully informed about the movement of the enemy than you can be about insect invaders if you but avail yourself of these modern services. Turn to page 16 of this issue and read about the marvels of "Spray Service by Wire and Air."

The most important single factors in successful spraying are thoroughness and timeliness. Without spraying being properly timed, it may be of little value. By utilizing the magic of electricity and the ether waves, timeliness of spraying is assured, providing the fruit grower is ready and alert. Thoroughness of spraying also is assured by motorization of the fruit farm. As a tractor hauls your modern sprayer into "firing position" in the orchard and a powerful pump shoots a surging, enveloping cloud of spray into the top of even the tallest tree, think of the poor fruit growers in the early eighteenth century who tried to fight pests with little hand syringes. You will find an interesting story of such early-day battles in the orchards of France told in "The History of Nicotine Sprays" on page 14.

Just as spraying equipment must be adequate for the size of the orchard (economy here may prove quite costly), so should orchard sanitation receive more attention. Despite the fact that there are approximately a quarter of a million spray rigs in use in the country for fighting our insect enemies, orchard sanitation is a vital supplementary measure to every carefully planned spray program. Orchard sanitation is often overlooked, perhaps for no other reason than because it is so obvious. In an article on page 11, Dr. D. L. Van Dine of the U. S. Bureau of Entomology and Plant Quarantine, in a very sane approach to the subject, tells just what is meant by the term "sanitation". Although the things he suggests are entirely practical and possible for any grower to do, he also points out, and very clearly, too, that a program of orchard sanitation must consist of more than a "lick and a promise". He saves the best for the last, however, by summing up his studies of the subject with the observation that thorough orchard sanitation is an almost sure-fire method of reducing the ranks of insect armies almost by half before the zero hour set for spray battles.

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Above: The McCormick-Deering 0-12 Tractor pulling a heavy McCormick-Deering Offset Disk Harrow in a California lemon grove.

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If you haven't become acquainted with the McCormick-Deering 0-12 Tractor, make it a point to see it at the McCormick-Deering dealer's store. Or ask him to take you out to see one at work in a nearby orchard. Talk with the owner and *you will be surprised!* The 0-12 is little in size and thrifty on fuel, but it's amazing how it goes to work when there is hard work to do. Complete orchard tractor information will be sent on request.

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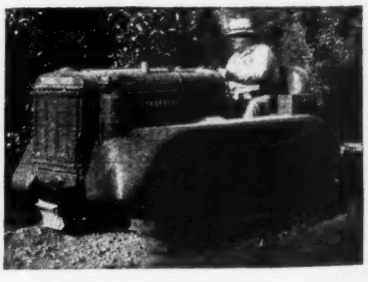
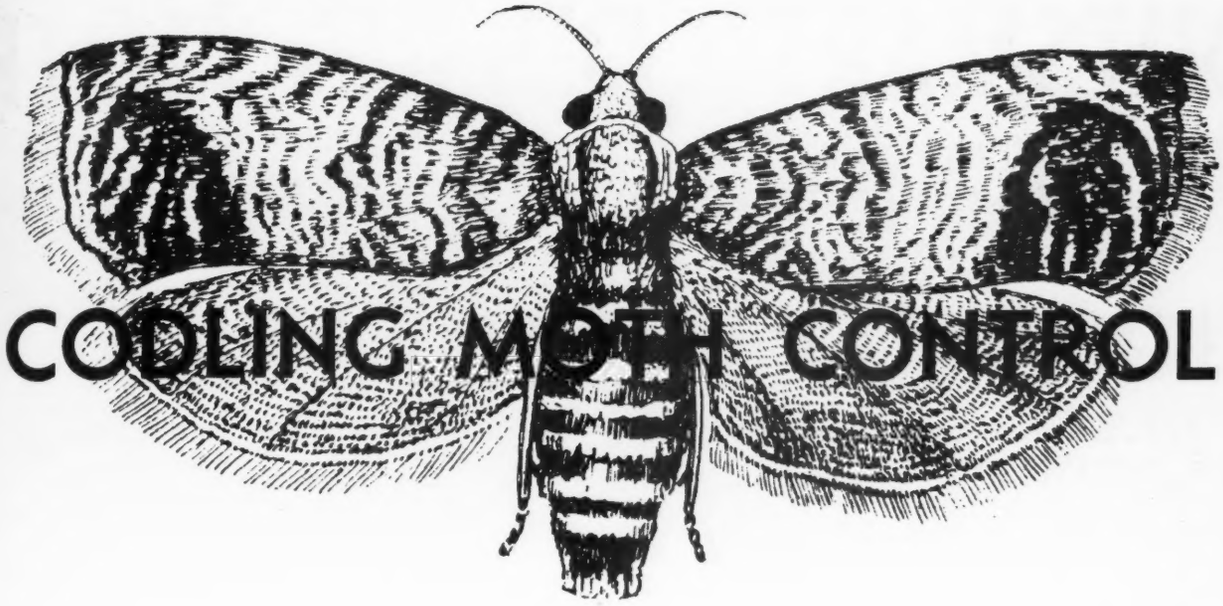


Wherever conditions call for crawler tractors, the McCormick-Deering T-20 TracTracTor, shown at the right, is a popular favorite. The T-20 has set new standards of crawler tractor accessibility and operating economy—a fact worth remembering when you need crawler power.

McCORMICK-DEERING Orchard Tractors



CODLING MOTH CONTROL

A Discussion

By LEROY CHILDS
Oregon Agricultural Experiment Station

TEN years ago it was a fairly easy and enjoyable pastime to prepare an article dealing with the codling moth and its control. Today it is quite another matter. "Why?" the reader may ask. The reasons are numerous. A decade ago our spray schedules included the use of a rather limited though effective number of insecticides and fungicides. The list comprised lead arsenate as a stomach poison, nicotine as a contact insecticide, lime-sulphur and Bordeaux mixture as fungicides. At that time oil was quite generally used as a dormant contact spray and then, as now, did not figure in the codling moth control program. Backed up by many years of investigational work prior to 10 years ago, it was possible to take this group of spray materials and work out a fairly safe and effective program for the problems that existed in the many and varied apple districts of the country. However, entomologists and plant pathologists as well as growers were not entirely satisfied with this group of materials, with the result that many innovations have been gradually added to meet certain specific conditions and to take care of what appears to be a more extensive and intensive codling moth situation than obtained 10 years ago.

To be satisfactory, a spray program for the apple or pear orchard must be designed to meet all of the insect and disease problems of importance. This situation demands that the insecticides and fungicides be compatible, effective, non-injurious to the trees and fruit, adaptable to a great range of climatic conditions, including the arid hot summers that exist in the Pacific Northwest and moist, more humid conditions of the Atlantic Coast. It is evident that all of the materials now available for spraying purposes will not work under this great range of conditions. That is why it is most difficult to write a comprehensive, usable article on codling moth control for the general reader.

A scene in Mr. Child's orchards at Hood River, Oregon

During the past 10 years we have seen many new materials come into the spraying picture. New forms of sulphur, new forms of copper, the fluosilicates, numerous types of spreading and sticking materials and, probably what is most disconcerting from the compatibility standpoint, the use of summer oil sprays. There is ample evidence to indicate that oils are dangerous where associated with sulphur sprays used in the spring and summer sprays for the control of such common diseases as apple scab, pear scab, mildew and numerous other diseases affecting fruit and foliage. Oftentimes, in the Northwest, oils will cause serious injury when applied as long as 30 or 40 days after a sulphur spray has been used. In many apple sections, disease control is equal if not more important than codling moth control. Doubtless, further testing of the new materials which have not stood the test of time experimentally and in the form of practical usage,

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OUTSMART CODLING MOTH

Cut Infestations In Half By Orchard Sanitation

By D. L. VAN DINE
Bureau of Entomology and Plant Quarantine
U.S. Dept. of Agriculture

IN dealing with the codling moth, growers for many years placed all their eggs in one basket; they have tended to depend on spraying to the exclusion of all other control measures. In recent years, however, with increasing difficulty in controlling the insect by spraying, together with the necessity for avoiding poisonous residues at harvest time that may be harmful to human health, there has been a tendency to revive many of the practices which were in general use before control by spraying came into vogue.

The normal level of codling moth population varies greatly in different regions of the country, the reasons for this being largely climatic. On the other hand, in the same region and even between sections of the same locality, variations in moth population do occur. We recognize that under a low level of infestation, control can be gained by a more reasonable spray schedule and that there is less of a residue problem at harvest time. It therefore follows that if we can insure a lower level of moth population, the codling moth-spray residue problem is greatly simplified.

Irrespective of the condition that brought about the unusual moth abundance, there is evidence that insecticides, including lead arsenate, have in many localities failed to control high infestations. Under conditions of unusual abundance of the insect, we are confronted not only with the limits of the efficiency of insecticides, but also with the limits of the tolerance of the trees to the insecticides. If infestations can be reduced, by measures other than spraying or by improvements in the technique of spraying, to a comparatively low level, we may maintain control by preventive means, that is, by not allowing those conditions to persist which may otherwise contribute to the building up of high infestations.

There is comparatively little that is new about the so-called supplementary measures. One hundred years ago, writers in horticultural magazines recommended gathering up the wormy apples immediately after their fall, and before the enclosed caterpillar had time to make its escape. The basic idea of the band was advanced in 1840 by a grower named Burrelle, who, in an article in the *New England Farmer*, suggested winding something around the tree, or placing a cloth in the crotch, and then destroying, in a hot oven, the larvae that were

(Continued on page 32)

Do You Do These Things?

Clear away ground debris, rough bark and decayed pruning stubs

?

Use chemically treated bands through the season

?

Apply sanitation measures to packing-shed interiors

?

Screen packing shed to prevent moth emergence

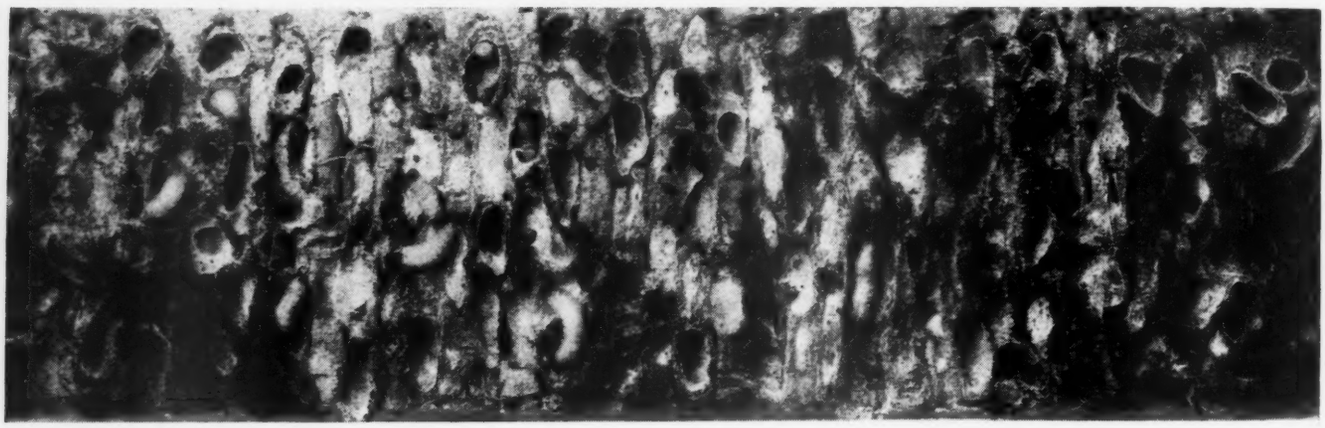
?

Sterilize boxes used in orchards

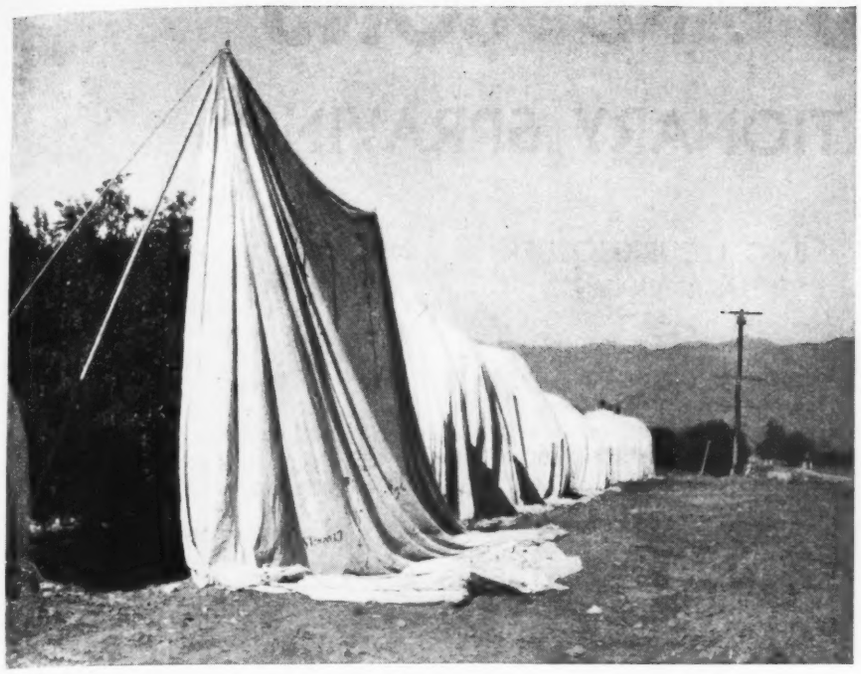
?

Practice early thinning off of wormy fruits

?



Numerous worms captured by chemically treated band placed on heavily infested tree. (Photograph taken before the chemical had time to kill the worms.)



Fumigation tents as used in the control of scab insects of citrus trees. The tent in the foreground is being pulled over the tree.

Controlling CITRUS INSECT PESTS *In California*

By RALPH H. SMITH, Entomologist
University of California Citrus Experiment Station

SITUATED two or three thousand miles away from the large marketing centers of the country, California citrus growers early realized that success for them depended upon their ability to produce oranges, lemons and grapefruit of premium quality and attractiveness, and to maintain a high yield per acre. Only by this means could they hope to offset the disadvantage of having to ship their crop across the continent to market. From the beginning, 60 years ago, to the present time, insect pests of various kinds have constituted one of the principal obstacles to the maintenance of this objective.

Scale insects are by far the most important pests of citrus trees. Their control presents a much more complicated problem to the citrus grower than is encountered by the grower of deciduous fruits, such as apples, pears and peaches. The subtropical climate of the citrus growing regions is conducive to the more or less continuous multiplication of insects throughout the year. The citrus tree is evergreen, bearing fruit and a dense foliage of broad leaves the year round. The control of the notorious San Jose scale and other forms of scale insects on deciduous trees is comparatively simple because the spraying can be done during the winter when the insects are on the bark and there are no leaves or fruit that may be injured or that may interfere in the task of getting the spray onto the insects.

There are four important species of scale insects that attack citrus trees in California. The California red scale, *Aonidiella aurantii,* and the purple scale, *Depidosaphes beckii,* are known as armoured scales and infest the leaves, fruit and bark of the trees throughout the year. The black scale, *Saissetia oleae,* and the gray scale, *Coccus Pseudomagnoliarum,* known as soft scales, infest the leaves during the summer and fall, but during the late winter months they move onto the smaller branches where they rapidly increase in size and produce large quantities of honeydew. The honeydew falls upon the leaves and fruit and supports the growth of a black, sooty-mold fungus, and necessitates the use of elaborate machinery for washing the fruit before it can be packed for shipment. The soft scales in particular have a prodigious capacity for reproduction. The black scale produces from 2000 to 6000 eggs and the gray scale from 1000 to 1500.

Two methods of control have been extensively employed, fumigation with hydrogen cyanide gas and spraying. In fumigating, the trees are covered with large tarpaulins or "tents" which remain in place for 40 minutes after the gas in liquid form has been introduced. The treatment requires the services of three men, two to pull the tents, and one to introduce the required amount of gas, using a specially designed applicator. The work is done entirely at night because treatment made in daylight results in severe injury to the trees. The fumigation method originated in 1887, and for a period of 40 years it was regarded the standard means of control. However, as a result of the subjection of countless billions of insects to the deadly gas year after year, there came into existence "resistant" strains or a physiological type of insect that is so constituted that it possesses a great tolerance for the gas. Resistant red, black and gray scales at present predominate in certain districts. In consequence, fumigation has decreased in popularity while increasing

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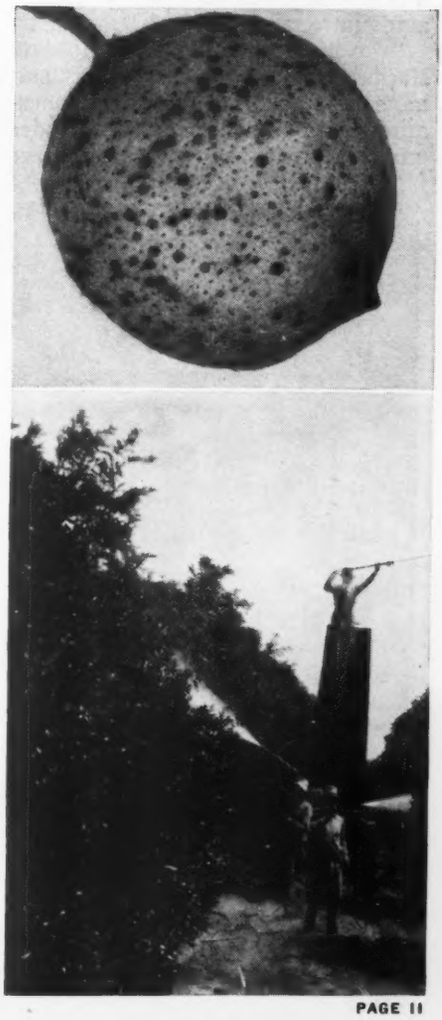


Right, top—Lemon infested with the California red scale, an insect that is similar to the San Jose scale. Below—Spraying orange trees for the control of scale insects, showing typical outfit at work.

PROS AND CONS
OF STATIONARY SPRAYING

By C. L. BURKHOLDER
Purdue University

SINCE the last discussion of costs of stationary and portable spraying in AMERICAN FRUIT GROWER, many letters have been received giving interesting and valuable personal experiences with the stationary method of spraying. The writer feels that it might be of considerable value to all fruit growers interested in this topic if some of the statements in these letters could be mentioned and briefly discussed.

Typical quotations from letters: "The tops of tall trees cannot be reached by stationary plant gunmen spraying from the ground. This detriment alone is sufficient to make the stationary method obsolete." Douglas W. Miller, Gerardstown, W. Va., operating a 200-acre stationary spray plant.

"Personally I feel that if we had to go back to portable sprayers with the large added cost of teams or tractors, along with stable room and additional permanent labor, I would just about as soon quit the orchard business." W. C. Reed and Son, Vincennes, Ind., operating a 223-acre stationary outfit.

"We have operated an up-to-date stationary plant for three years and have kept accurate records of operating costs and pest control. Under our conditions, the results in disease and insect control, particularly in the tops of tall trees, have forced us to reverse our initial stand (favorable) and we are not recommending the purchase of stationary outfits except in those mountain orchards where it is practically impossible to handle a portable outfit."—F. J. Schneiderhan, associate pathologist, Agricultural Experiment Station, Kearneysville, W. Va.

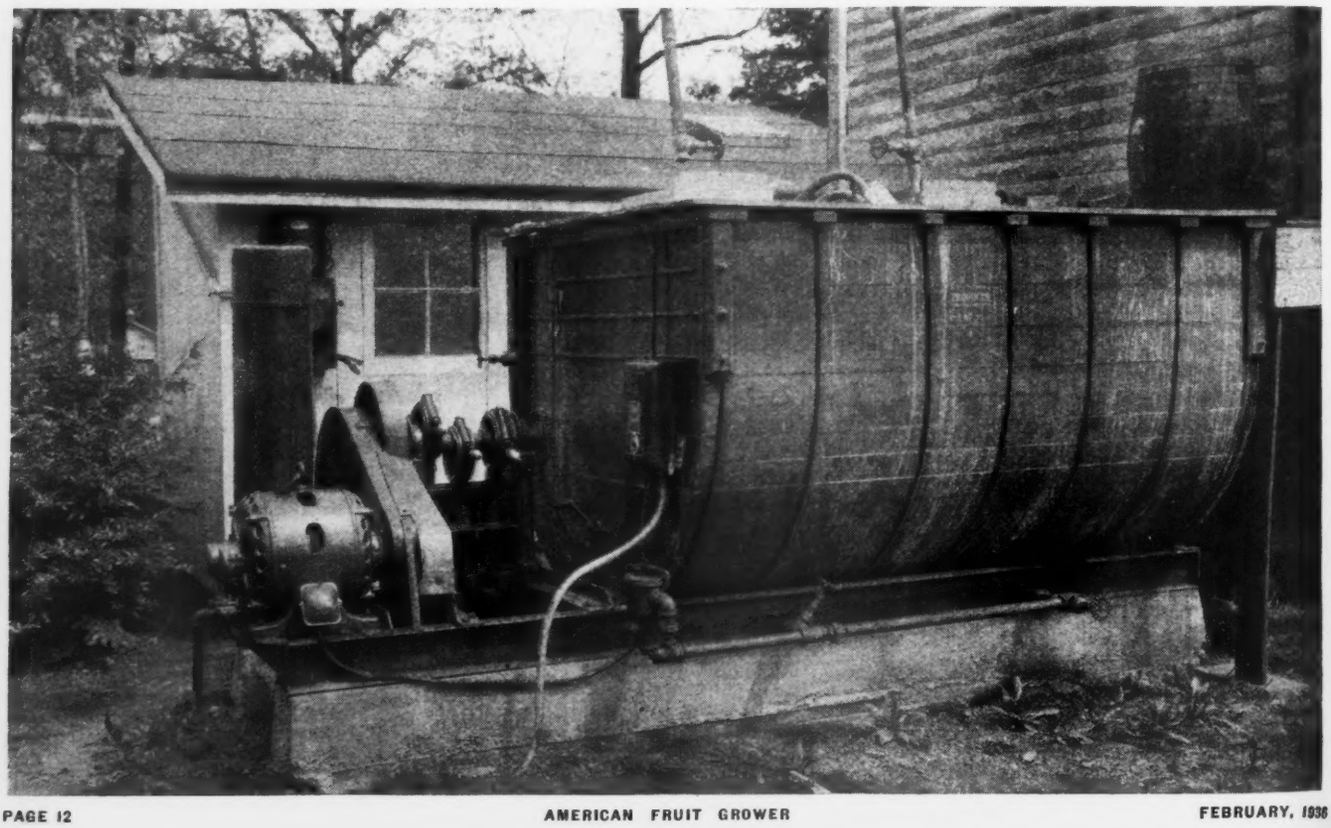
(1) Failure to control disease and codling moth in tops is without doubt a serious accusation. Poor control in tops of high trees has been mentioned by three operators. All used "spray brooms" with three to six nozzles. In the case of two plants in Indiana, in the same community, one using a broom and the other a spray gun on the same age trees, good control of both disease and codling moth was obtained in the tops of trees with guns, but disastrous control resulted with "brooms."

At the Purdue orchard at Bedford, where most of the trees are mature, high trees, it is necessary to use shade tree tips in the guns on many days on which spraying must be carried on. In some makes of guns the tips give a very long-range, driving, mist spray, which can be reduced to a wide, close spray by the gun adjustment. Tips cost $1 each. Tips do not work well on all makes of guns.

Even with this precaution much poorer codling moth control was evident in the top third of these trees.

In 1935 one 30-acre block in this orchard was given three top-off cover sprays with a portable rig and tower during the first brood codling moth egg hatch, in addition to the regular cover sprays applied with the stationary equipment. On another 35-acre block adjacent, two special top-off sprays were given. These applications were made from the ground to the outside and inside of the tops. The regular stationary equipment was used. Both methods of giving extra attention to better coverage in the top fourth of the trees gave excellent results and actual entrances of codling moth were reduced in both cases to about one per cent at harvest. (No summer drop record included.)

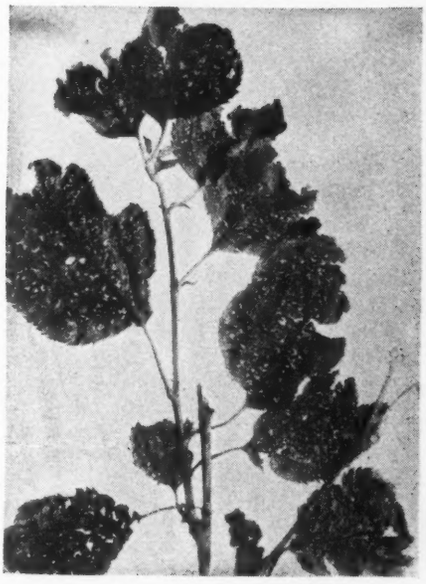
(Continued on page 30)



The stationary spray plant at the Purdue Orchard at Bedford, Ind., is covered with a waterproof tarpaulin when not in use. This arrangement is better than the plant at Lafayette, which is housed in a small building.

Early season damage by adults of the flea weevil

WINNING THE FIGHT AGAINST APPLE FLEA WEEVIL



Extreme damage to mature apple foliage by the apple flea weevil. Orchards have been observed in Ohio in which every leaf of every tree was injured to the extent shown above.

By J. S. HOUSER

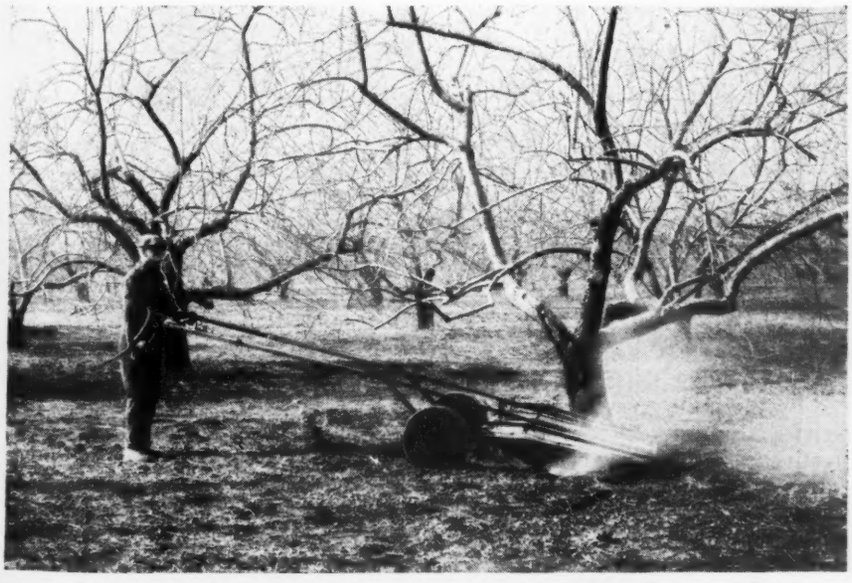
Ohio Experiment Station

IF ONE is familiar with the work of the apple flea weevil, it is possible to find evidence of the presence of this insect in practically any middle-aged or elderly apple orchard, particularly if the trees are growing in sod. Younger trees growing in the immediate vicinity of heavily infested older trees likewise may be attacked.

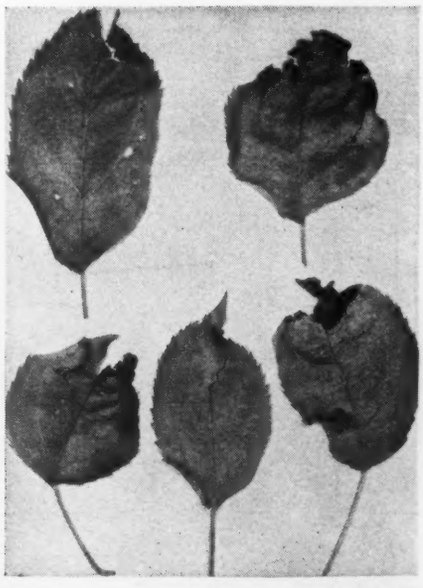
Orchardists who are unacquainted with the work of this insect may determine for themselves whether it is gaining a foothold by the simple procedure of standing near the trunk of the tree and looking skyward through the foliage in the center of the tree. If the weevil is present, even in moderate numbers, it will be observed that the leaves show numerous tiny punctures or holes. The injury of this type may appear after the tree reaches full foliage in the spring, but is present in an increased amount by late July or early August. It will be observed also that many leaves are damaged still further by the presence of blotch-like mines. These are most clearly noticeable in June and July.

The apple flea weevil is an insect

(Continued on page 26)



The ingenuity of Ohio station workers is shown by the construction and use of this power blast torch for use against the flea weevil



The characteristic blotch mines made by the larvae of the apple flea weevil

1763 1936

HAND SYRINGE TO MODERN POWER SPRAYERS

The History of Nicotine Sprays

By JONAS HOWARD

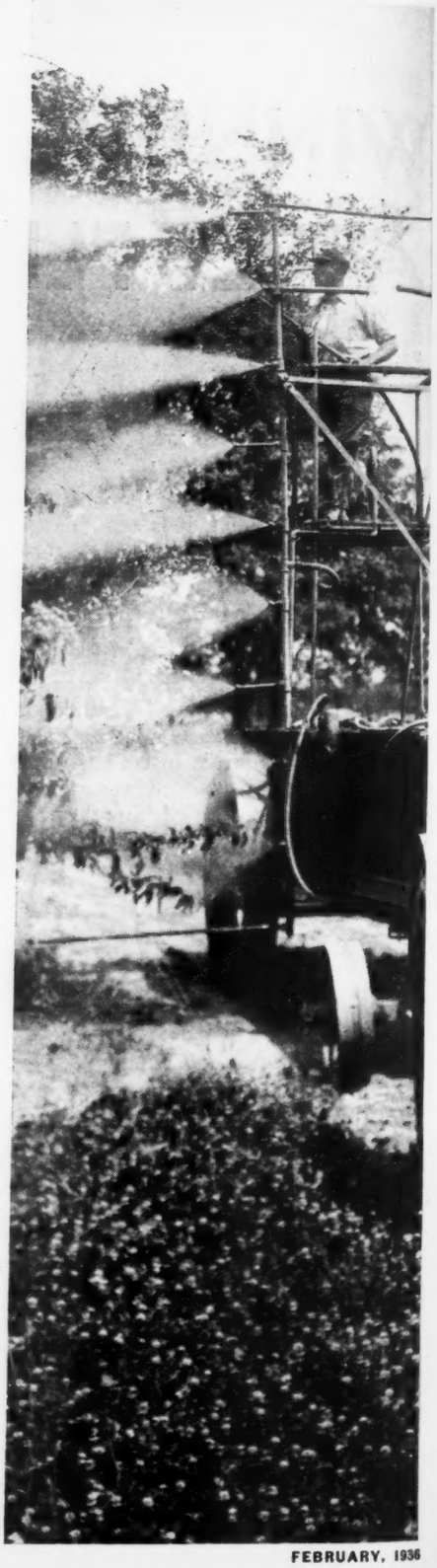
"HO, varlet, another syringeful of tobacco water! And make haste—or a plague upon thy clumsiness, as well as upon these cursed plant lice!"

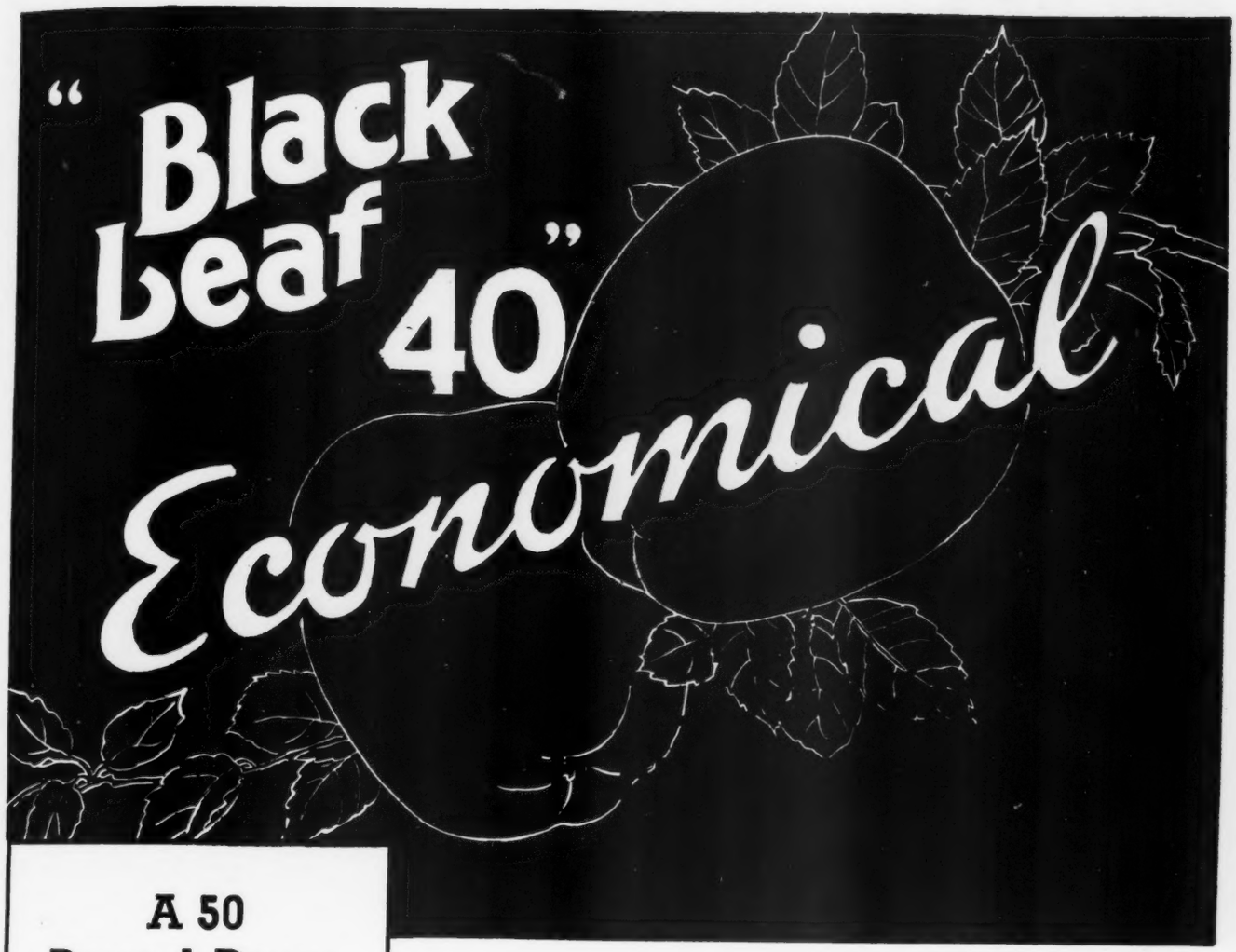
The speaker, perched precariously at the top of a wobbly ladder, is a French fruit grower of the early eighteenth century. Armed with a tiny syringe containing a crudely compounded nicotine spray, he is trying to eliminate aphis among his cherished fruit trees by patiently endeavoring to score a "bull's-eye" with the pathetically minute spray stream he manages to produce by tedious effort.

The scene is the environs of Marseilles in the south of France, for it was there in 1763—more than 170 years ago—that the use of nicotine as a spray material for the control of aphis, then called plant lice, was first recorded.

To the American fruit grower of today, such a scene is laughable. In place of an ineffectual hand syringe, he fights his worst enemies with powerful motorized sprayers that resemble modern fire-fighting equipment. And that the spray materials used by the fruit grower of today be scientifically correct for maximum effectiveness under varying conditions, research specialists toil year in and year out in laboratories throughout the land, whereas in the days when French fruit growers scurried up and down their orchards taking

(Continued on page 42)





A 50 Pound Drum *of* "Black Leaf 40" *Makes*

4000 gallons of spray
(at 1 pint to 100 gallons of water)

5000 gallons of spray
(at ¾ pint to 100 gallons of water)

6000 gallons of spray
(at ⅔ pint to 100 gallons of water)

8000 gallons of spray
(at ½ pint to 100 gallons of water)

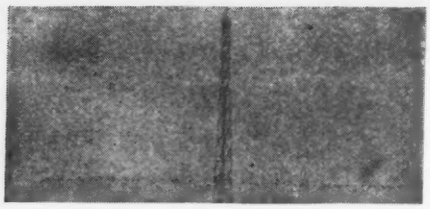
See Your Spray Material Dealer

MORE than two decades of use show that one ***delayed dormant combination spray*** of "Black Leaf 40", Lead Arsenate, and Lime Sulphur controls Rosy Aphis, Bud Moth, San Jose Scale, Scab and other pests, if present. Because "Black Leaf 40" is usable with these standard materials, there is no need to apply it separately. Thus, by this one delayed dormant spray, you effect a real economy of time and labor, without risk of tree injury.

"Black Leaf 40" is Safe .. Easy to Use

"Black Leaf 40" is a poison of vegetable origin. It is not caustic—does not "burn" man, horses, trees or crop. It is volatile and "fumes-off" (evaporates) leaving no residue problem to be solved. "Black Leaf 40" is highly concentrated—effective—easy to mix and apply. It kills many different kinds of insects and fortifies other standard spray materials with which it may be used.

3625



SPRAY SERVICE BY WIRE AND AIR

By W. H. ZIPF

ONE afternoon when the eyes of the nation were focused on happenings of the World War far across the sea, a crisp message flashed over telegraph wires of New York state:

DR M F BARRUS
EXTENSION PLANT
PATHOLOGIST
CORNELL UNIVERSITY
ITHACA NEW YORK
SCAB FUNGI REACHING
ASCOSPORE STAGE STOP
RAIN IN FEW DAYS
WOULD CAUSE RELEASE
HERE STOP AWAITING
ADVICE
E. P. JOHNSON
COUNTY AGRICULTURAL
AGENT

Not a code message for special agents of the army intelligence corps but a message from an agent of the intelligence corps of those men of science waging war against an enemy of the apple.

A few days later, after weather maps were consulted and advice was obtained from the government weather bureau, a telephone call went out from the pathologists at Cornell University to the agents in the district represented by the sender of the above telegram:

"Advise your growers to apply scab spray today, or tomorrow at the latest, in anticipation of rain."

And so this message to the "front" was relayed from the agents to growers and then the growers passed it on by telephone to other growers in their localities. In this manner the telephone took word to growers giving the "zero hour" of attack and aided them in their advance on the enemy—apple scab.

New York was the first state to have an organized spray service. It started during the World War and was operated by telegraph and telephone as described above. Under this initial system one specialist was stationed in each county. The men would report by letter, or by wire if the situation was urgent, to plant pathologists at Cornell University. These workers would then map out the procedure to be followed by the growers in the various districts for their spraying operations. In order to make the service timely, word was sent to the agents by telephone and then the specialists or agents would relay the advice of the pathologists to the growers.

The specialists were trained to observe the development of the scab fungi and in this manner they were able to give accurate reports to the pathologists. They also reported the development of the tree buds, and with this composite information the pathologists were able to draw up a plan of control.

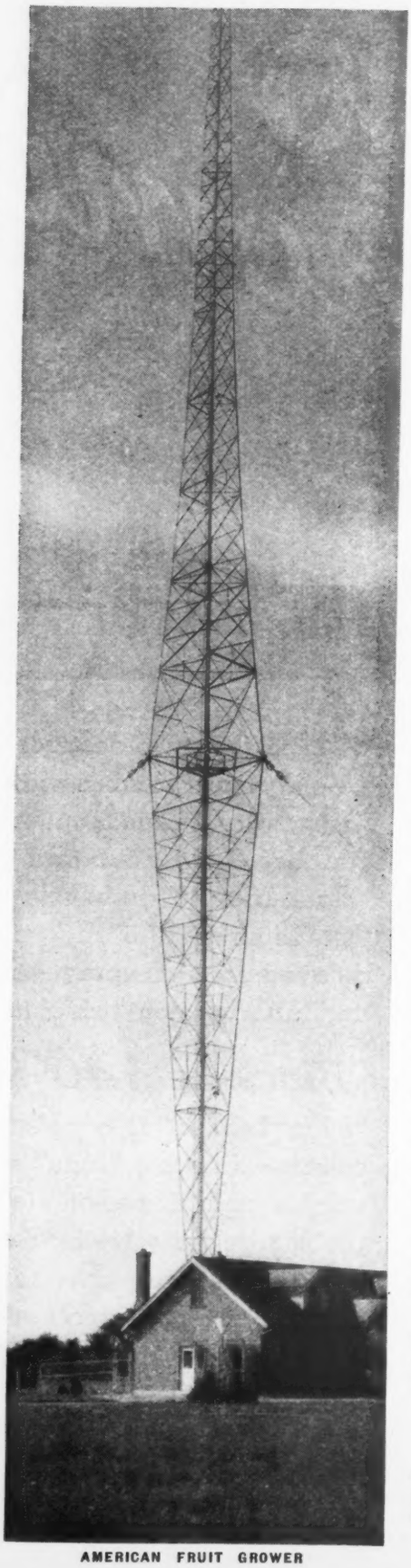
Other states followed the lead of New York and soon experts in several states were using the same means of communication for contacting the growers of their individual states. Thus this method of spray news dissemination soon became national in scope.

The telephone and telegraph provided means of coping with time, one of the most important factors connected with the spraying operations. This type of service has also brought about splendid co-operation among growers. The county agent or specialist need call but one grower in a given locality and this grower then relays the message to his neighbor. The ease of presenting timely information to growers by the telephone and telegraph made it possible to put the service on a working basis in many of the important fruit states in the country. And so, from this beginning in New York the use of spray service to bring the "all-important" timeliness to the spray operations of growers has grown by leaps and bounds, thanks to the telephone and telegraph.

Another prominent means of communication was soon to play a rôle in several states throughout the country.

One of the pathologists working on the spray service in New York when the service started was Dr. A. L. Pierstorff. His work with the

(Continued on page 31)



This modern 378-foot radio broadcasting aerial is operated by Station WBNS at Columbus, Ohio. It is the latest type radio tower and replaces the old-style two-tower aerial.

Insect killing reaches NEW EFFICIENCY with these TWO SPRAY OILS

SUPERLA
SUMMER SPRAY OIL
For Controlling Codling Moths

Again and again the high killing power of Superla has been proved. Its effectiveness over old type oils has been clearly demonstrated by its results on late-harvested fruit, which has shown almost as high a percentage of clean fruit as the varieties picked early in fall.

This is convincing evidence that Superla's unusual power to resist absorption of oil by plant tissues enables the oil to stay on the fruit for a *longer time.* This kills late hatched worms and destroys the eggs.

The results obtained with Superla Summer Spray Oil in commercial application during 1935, have confirmed in every particular the findings of the 1934 field tests, when it was first in every competitive test made.

Of the eight winners of a Certificate of Merit in the "95% Clean Apple" Club of the Illinois Horticultural Society, five used Standard's Spray Oils; three of the five using Superla and lead; one using Dendrol and lead; and one using Verdol and Nicotine.

Of the five prize winners at a recent Missouri Valley Apple Show, four, including winner of first prize, were Superla users.

Write for the Superla book and learn more about this amazingly efficient spray oil.

DENDROL
DORMANT SPRAY OIL
For Controlling Insects

Dormant Spraying with Dendrol is the most effective treatment to use in controlling San Jose scale, Leaf Roller, Red Mite and other destructive insects. Used as directed, it assures complete control of most species and a strong practical control of all of them.

Dendrol Dormant Spray Oil is economical to use, and it saves money for the grower by reducing the later use of the more expensive summer sprays. Also it leaves the trees stronger and better able to resist the attack of pests that appear during the growing season.

Insects which can be controlled economically and effectively with Dendrol Dormant Spray Oil are: On Apples—San Jose Scale, Leaf Roller, Red Mites, Bud Moth, Case Bearers and Aphids. On Pears—Pear Psylla, Red Mites and Scale. On Peaches—San Jose Scale, Red Mites and, with Bordeaux, Peach leaf curl. On Cherries—Case bearers, and Scale.

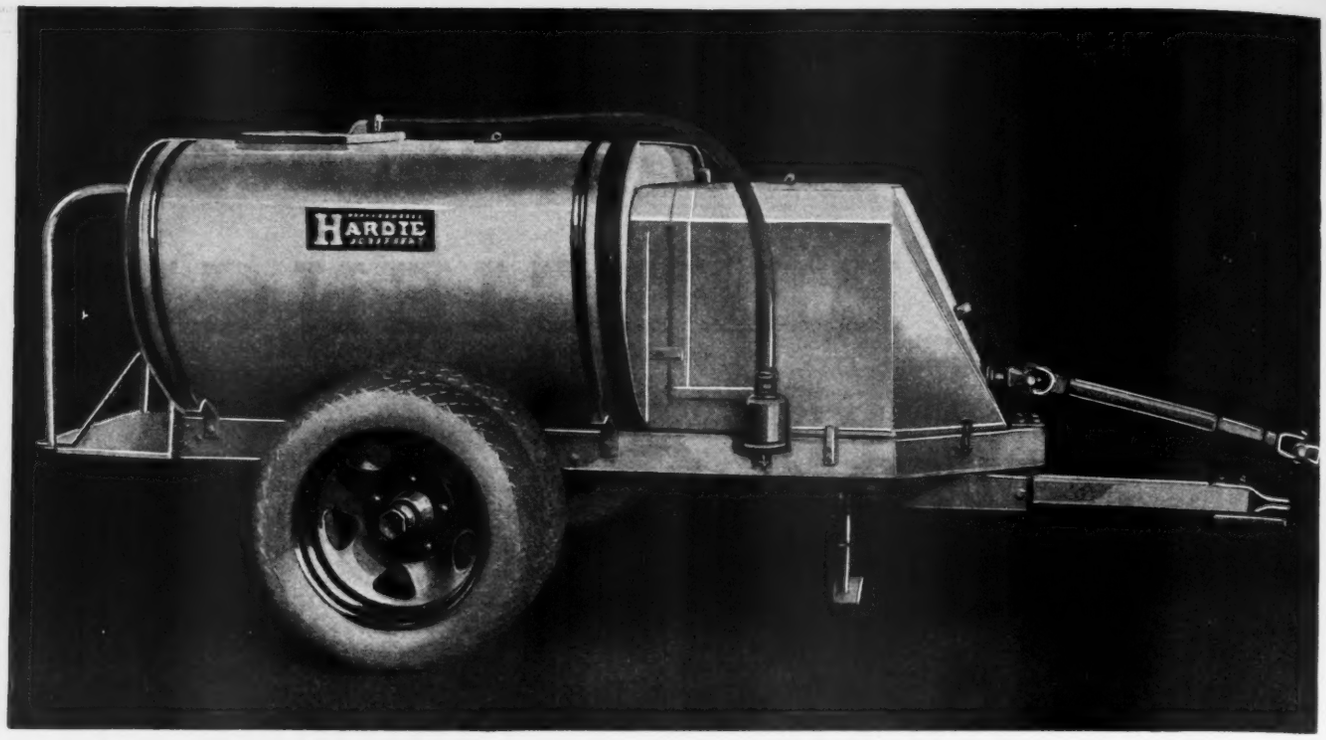
For complete information concerning Dendrol Dormant Spray Oil and its uses, write for the new Dendrol folder.

Get ready to boost 1936 fruit profits by ordering these two leading spray oils right now. Your nearest Standard Oil agent can supply you, and can tell you more about utilizing their new insect-killing efficiency!

PRODUCTS OF

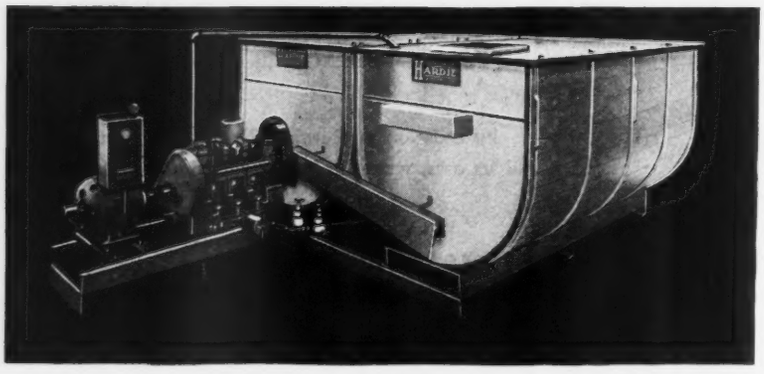
STANDARD OIL COMPANY

910 South Michigan Avenue, Chicago, Illinois



● Really Streamlined ● Fully Armored and Dust Proofed ● Roller Bearings on All Wheels ● Interchangeable Wood or Steel Tanks ● All Moving Parts, Including Plungers, Running in a Bath of Filtered Oil ● Short-turn Trucks ● Rubber or Steel Wheels

Notice the absence of all projecting parts from the Hardie fully streamlined outfits. Notice the complete dust proofing made possible only by the elimination of the troublesome radiator.



Hardie supremacy in the stationary sprayer field comes from the great ease with which Hardie pumps meet high pressure requirements, freedom from trouble and low operating cost.

YOU can do more with a Hardie sprayer today than ever before.

The well-established and never equalled pump efficiency of the Hardie is embodied in units that contribute in many and valuable ways to thoroughness, economy and convenience in all spraying operations.

Streamlining avoids loss of fruit or damage to trees by projecting sprayer parts and loss of time in dislodging branches caught on the sprayer.

Roller bearing trucks of our own special design reduce the pull 50%.

Pump and engine are entirely enclosed and completely protected by dust-proof steel hood in which there is no troublesome radiator to suck in dust, dirt and spray.

Platform at rear with guard rails on the larger outfit speeds spraying and greatly facilitates the work of hose men.

Every little detail of design and construction in the Hardie tends towards still more effective work and greater economy. Hardie offers a new higher standard of sprayer performance.

All Hardie sprayers easily maintain their rated pressures and capacities at normal speeds. This gives long life at an almost unbelievably low cost for operation and maintenance.

Complete, positive, abundant lubrication, including plungers, stops wear, reduces operating cost.

Here is the really perfected, fully equipped sprayer. Available in a wide range of sizes and capacities.

See the Hardies before you buy. Write for catalog showing 40 sizes and styles of portable and stationary Hardies powered by truck, tractor, gasoline engine or electric motor, delivering 3 to 50 gallons per minute at 300 to 800 pounds pressure per square inch, for every spraying job.

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HARDIE DEPENDABLE SPRAYERS

AMERICAN POMOLOGY

A Page Conducted in the Interests of the American Pomological Society

1936 Shows Increased Membership

MEMBERSHIPS paid up for 1936 have been coming in quite regularly. An increase in memberships like that already secured over and above that of last year is very encouraging.

The Proceedings of the Hartford meeting we hope can be printed much earlier than was possible last year. This proceedings will be larger in size and will contain a great store of practical information for fruit growers. Small fruits, cultural methods, varieties, peach growing, soil management in orchards, marketing, economic drifts for horticulture, practical cold storage on the farm, are only a few of the live topics which were discussed at the Hartford meeting. These proceedings we believe to be worth many times the $1.25 membership fee of the A.P.S., which includes a year's subscription to AMERICAN FRUIT GROWER.

New England Setting Pace

New England fruit growers are an up-to-date group who have adopted production methods which are yielding good crops of first grade fruit, and their market is right next to their front door. Their chief variety is McIntosh, which grows to perfection and brings good money. When placed in cold storage promptly it can be held well into the winter months. Other important varieties grown in New England are Delicious, Stayman, Tompkins King, Rhode Island Greening and Baldwin. Cortland, where well adapted, is making a good record for production and has established itself as a profitable variety. Growers are also reporting good results with Melba, Early McIntosh and Milton as early apples.

New England is making rapid strides as a fruit growing region, because where modern methods of production have been adopted, fruit growers are finding that high grade fruit can be produced and the nearby markets are readily absorbing the fruit during most seasons.

An idea as to the importance of the apple industry of the New England states can be gained by reviewing the December 1 record of the commercial crop produced in 1935 as reported by the U. S. D. A. This is as follows: Maine 588,000 bushels, New Hampshire 490,000 bushels, Vermont 502,000 bushels, Connecticut 621,000 bushels and Massachusetts 1,829,000 bushels. New York produced 9,840,000 bushels, Pennsylvania 4,004,000 bushels and New Jersey 2,730,000 bushels, making a total of 20,604,000 bushels produced by this northeastern group of states, which amounts to 22 per cent of the total crop of 91,701,000 bushels of apples produced in the United States. That 20 per cent of the commercial apple crop is produced within a short distance of the great consuming markets is of considerable interest and perhaps is significant of economic trends.

Report on Nomenclature

Report of the Committee on Nomenclature as presented to the A. P. S. for action at the Hartford meeting contained several items of general interest. This committee consists of Paul Stark, Louisiana, Mo.; Dr. M. B. Davis, Dominion horticulturist, Ottawa, Canada; and its chairman, Dr. M. J. Dorsey, Department of Horticulture, University of Illinois, Urbana, Ill.

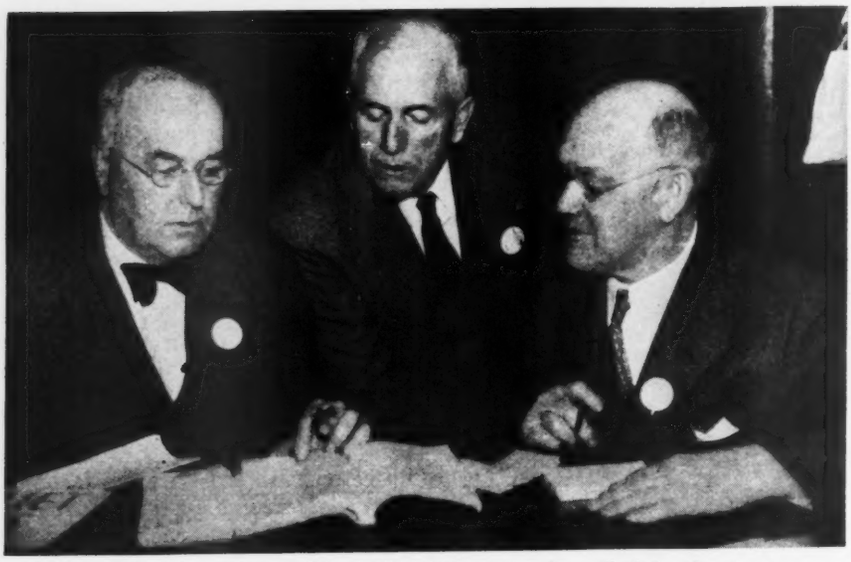
The report says that, "During the last year the Committte on Nomenclature has completed the revision of the rules. Some inquiries have come in for assistance in naming new fruits. This makes it perfectly clear that along with the efforts of the Committee on Nomenclature there should be available some research information on names in general. It would seem that this should constitute one of the next steps in the committee's efforts in view of the complexity of the situation in general. The committee feels that the time has come when this general question, together with that of a registration system, should be given consideration by all the interests involved.. . . . It is evident that there is some difference of opinion on other points involved in the naming of fruits, and, as seems desirable, new sections should be added to the code to cover some of these points. It is difficult, at best, to set up the different provisions of the code so that the wording will permit of no other interpretation than that intended. It is the wish of the committee that those interested in making the code a more vital factor in naming new fruits, write the committee their suggestions."

The Committee on the Code of Nomenclature has consisted of three members. Upon the suggestion of Dr. M. J. Dorsey, chairman, the A. P. S. took formal action to revise the By-laws to permit the appointment of five members to the committee. This action admits a member to be appointed to represent nut growers, and one to represent small fruits.

Cranberry Production

Where are cranberries grown? Cranberries are one of the very specialized crops, and the bulk of the crop is produced by five states. Massachusetts is by long odds the chief producer, having a total crop in 1935 of 300,000 barrels. Out of a total U. S. crop of 486,500 barrels, New Jersey produced 80,000 barrels, Wisconsin 85,000. Washington 17,000 and Oregon 4,500.

Camera!



New officials take hold! Millard F. Hincher (left) of Morton, 1936 president of the New York society; George A. Morse (center) of Williamson, vice president; and (right) Roy P. McPherson of Leroy, secretary.

Jay Gelder, manager of the Chazy Orchards, left, and Dr. A. B. Burrell, Champlain Valley fruit specialist, chat with B. J. Case, Sodus, a member of the New York society for 56 years.

Dr. H. B. Tukey of the New York station, left, inspects an apple with J. G. Case, Sodus, ex-president of New York society.

81st New York Meeting

FRUIT growers of the Empire state held the 81st annual meeting of the New York State Horticultural Society at Edgerton Park in Rochester January 14-17. The four-day program was filled with interesting speakers and was featured by several discussions. Outstanding in the discussion phase of the busy program were the question boxes which were lead by Dr. H. B. Tukey of the New York Agricultural Experiment Station. Questions discussed during these periods were taken from those sent in to the secretary by members previous to the meeting.

The program was held in the assembly hall of the park and the large exhibit hall was filled with the booths of various commercial concerns handling items of interest to the fruit grower. In this same building were exhibits of fruit insect and disease pests prepared by the entomologists, plant pathologists and horticulturists of the College of Agriculture at Cornell University and workers from the New York Experiment Station at Geneva. Another exhibit in this educational group was that of the U. S. D. A. Soil Conservation Service. Bulletins of the New York station pertaining to fruit production were issued to those desiring them.

From Cornell University there appeared on the program W. D. Mills, Joseph Oskamp, G. P. Scoville and A. J. Heinicke. On the program from the New York Experiment Station were P. J. Chapman, P. J. Parrott, W. S. Harman and H. B. Tukey. These men spoke on a variety of subjects pertaining to fruit production.

Hon. Peter G. Ten Eyck, commissioner of the New York State Department of Agriculture and Markets in Albany, talked on the state's relation to the fruit growers of New York. One of the principal out-of-state speakers was Dr. E. L. Overholser, head of the Department of Horticulture of Washington State College, who gave an interesting picture of apple production in the state of Washington at one of the evening sessions. At another session he spoke on residue removal as affected by bruising.

Director V. R. Gardner of the Michigan Agricultural Experiment Station gave two talks before the meeting, the first on some of the problems encountered in raising sour cherries, and the second concerned trends and adjustments in the fruit industry. The Bureau of Plant Industry of the New York State Department of Agriculture contributed a speaker in the person of A. B. Buchholz, who talked on the open crate and the apple grading law. Mr. Buchholz is director of the Bureau of Plant Industry.

Dr. G. F. Warren, agricultural economist at Cornell University, spoke on prices of farm products. C. R. Plumb, director of the Bureau of Food Control of the New York State Department of Agriculture and Markets, presented the tolerance requirements to those present.

E. Stuart Hubbard, grower and commission merchant of Poughkeepsie and New York City, brought the work of the New York and New England Apple Institute to the growers in attendance. He also showed colored motion pictures of the harvesting, packing and marketing of apples. The latter was given at an evening meeting, as was a lantern slide talk by Dr. Tukey on his trip to England.

Growers on the program were Sheldon W. Funk, Boyertown, Pa.; G. S. L. Carpenter, Hagerstown, Md.; George A. Drew, Westford, Mass.; Frame Brown, Columbus, Ohio; Clarence J. Neal, Cleveland, Ohio; H. L. Mantle, Painesville, Ohio, and C. L. Holland, Chardon, Ohio. The latter four growers from Ohio took part in the discussions.

The U. S. D. A. was represented on the

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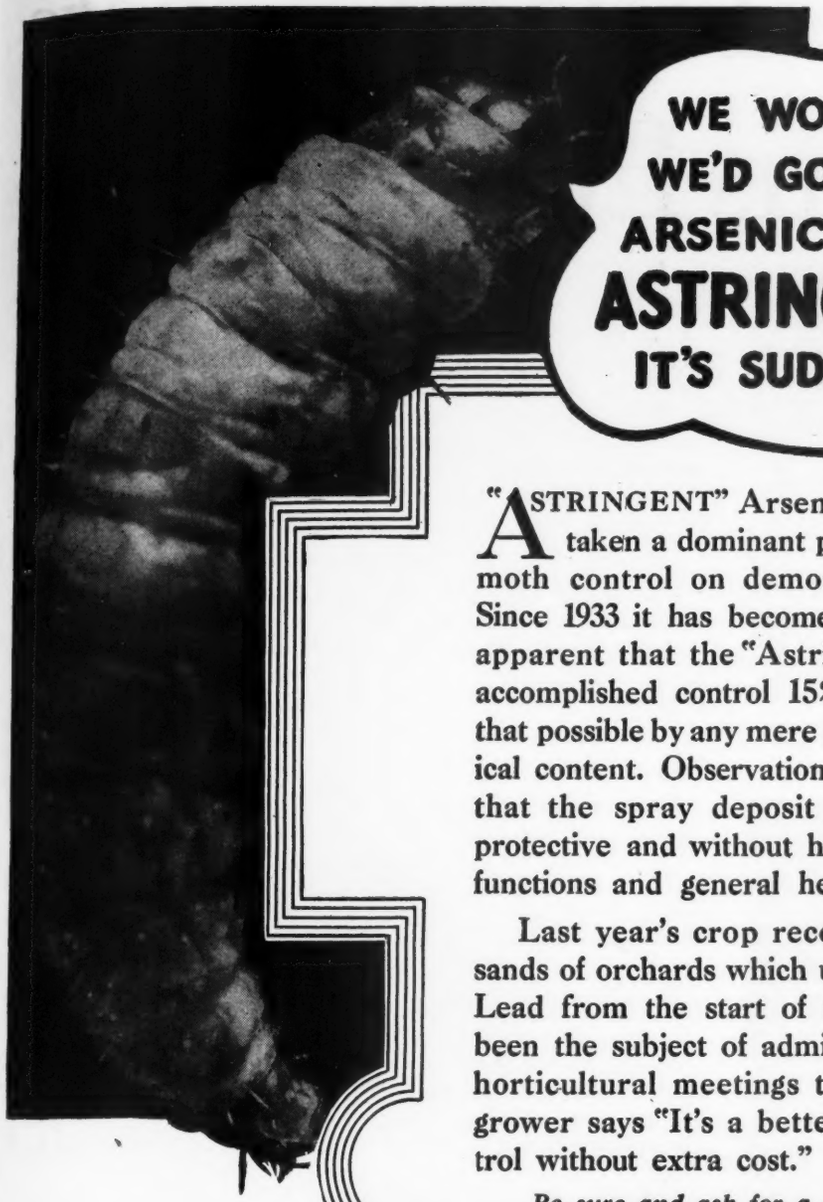


WE WORMS THOUGHT WE'D GOTTEN USED TO ARSENIC...BUT WITH AN ASTRINGENT..*Wow!* IT'S SUDDEN DEATH

"ASTRINGENT" Arsenate of Lead has taken a dominant position in codling moth control on demonstrated results. Since 1933 it has become more and more apparent that the "Astringent" principle accomplished control 15% to 20% beyond that possible by any mere increase in arsenical content. Observation has shown, too, that the spray deposit was adequately protective and without hazard to the leaf functions and general health of the tree.

Last year's crop records, from thousands of orchards which used "Astringent" Lead from the start of the season, have been the subject of admiring comment at horticultural meetings this winter. The grower says "It's a better means of control without extra cost."

Be sure and ask for a copy of "Cash Crops." It contains valuable spray data.

ORCHARD BRAND

REG U.S. PAT. OFF

SPRAYS AND DUSTS

New 1936 EDITION

GENERAL CHEMICAL COMPANY...40 Rector St., New York

Also: ATLANTA, BALTIMORE, BOSTON, BUFFALO, CHARLOTTE, CHICAGO, CLEVELAND, DENVER, KANSAS CITY, LOS ANGELES, MINNEAPOLIS, MONTEZUMA (GA.), PHILADELPHIA, PITTSBURGH, PROVIDENCE, SAN FRANCISCO, SEATTLE, ST. LOUIS.

Please send me a copy of "Cash Crops." I am interested in "Astringent" Lead and also in the product (s) I have underscored below.

Name & Address .....

ALSO: LIME SULPHUR SOLUTION — DRY LIME SULPHUR — OIL EMULSION "83" — STANDARD ARSENATE OF LEAD — CALCIUM ARSENATE — ARSENITE OF ZINC — BASIC ZINC ARSENATE — PARIS GREEN — BORDEAUX MIXTURE — DRITOMIC SULPHUR — APPLE DRITOMIC SULPHUR — PARADICHLOROBENZENE — NICOTINE SULPHATE 40% — X-13 (PYRETHRUM EXTRACT) — FUNGI (SULPHUR) DUST — SULPHUR-ARSENICAL DUSTS — BORDEAUX-ARSENICAL DUST — COPPER LIME DUSTS — ROTENONE DUST

Reduce Tillage Costs With This Equipment

The John Deer-Van Brunt Model CC Cultivator is great for handling cover crops. Wheels inside frame do not interfere. Shields protect foliage.

John Deere Model HD Heavy-Duty Disk Harrow, latest in tractor-controlled disk harrows, has no superior in orchard or grove work.

John Deer Model OF Offset Disk Harrow is a great favorite especially in California and the Pacific northwest; low-down and rugged. Offsets right or left.

YOU'LL do better work and more work, reduce production costs and increase crop yields with the aid of this dependable, easy-handling, tractor-controlled John Deere tillage equipment—rugged disk harrows, spring- and stiff-tooth cultivators, and spring-tooth harrows—designed to meet all requirements in orchard, grove, vineyard and field.

No job comes too tough for these machines—they're built from the ground up to take the hard knocks.

* * *

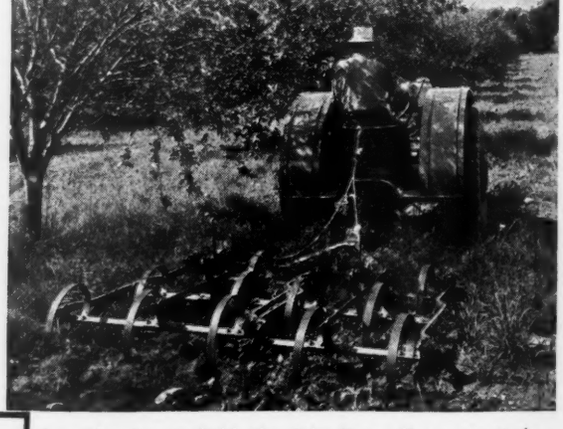
The Model CC Cultivator can be furnished with shovels in various styles and sizes for all tillage—making seed beds, cultivating orchards, alfalfa, stubble land, and eradicating all weeds. Simple adjustment for deep or shallow tillage. Screw depth regulator operated from tractor. Power lift raises teeth when you pull a rope. Shields protect foliage.

* * *

Front and rear gangs of the disk harrows are angled and straightened independently by tractor power—just pull a trip rope. Heavy steel welded construction, heat-treated steel blades, Alemite lubrication, heavy-duty chilled bearings, adjustable spring pressure, wide spacing of disks—these are features that assure good work, long life and low upkeep.

* * *

Teeth of the John Deere tractor-controlled spring-tooth harrow are raised and lowered in an entirely new, simple manner, from the tractor seat. No long levers to catch on low-hanging limbs. The combination of John Deere *special-process* heat-treated teeth and *heat-treated* tooth bars gives you heavy duty construction that means years of good work in orchard and field.



In orchard or in field, the John Deere Tractor-controlled Spring-Tooth Harrow saves time in cultivation and in weeding.

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Please send me, free of cost and without obligation, your new, big book on "Better Farming." Also send special literature on the machines I have listed at left.

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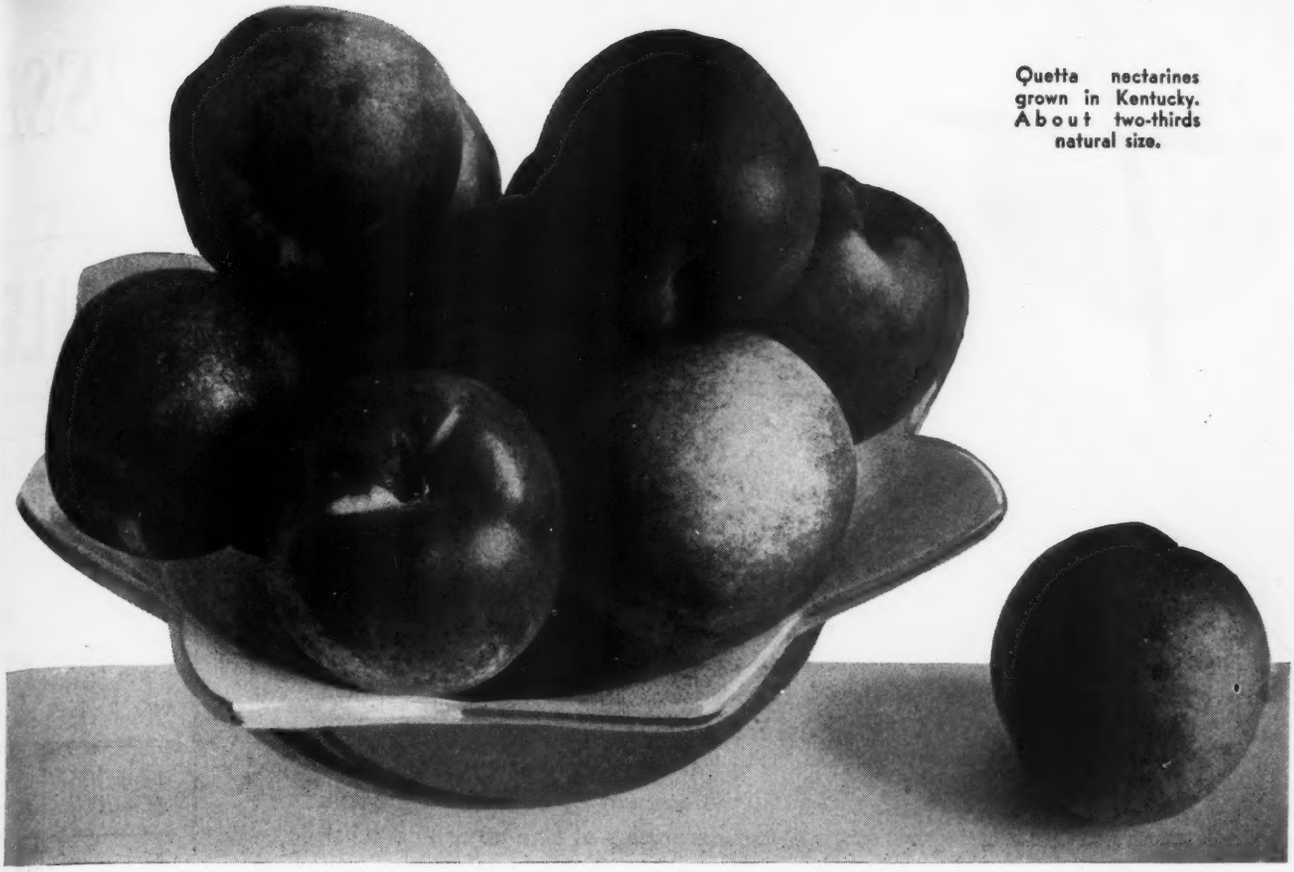


Quetta nectarines grown in Kentucky. About two-thirds natural size.

A NATIVE FROM INDIA THAT HAS NOW BEEN AMERICANIZED

By W. E. WHITEHOUSE
Bureau of Plant Industry
U.S. Dept. of Agriculture

The Quetta Nectarine

AT THE time this article was written the U.S.D.A., through its Division of Plant Exploration and Introduction, had made 110,250 plant introductions as the result of a systematic world search for new and promising crops. One of the introductions made in 1906, through the courtesy of an English army officer located at Quetta, one of the outposts of the British Empire in Baluchistan, northwestern India, consisted of a small number of peach and nectarine seeds from that country. These seeds were collected from trees in a garden at Quetta which bore the best fruit. Records show that in the valley in which Quetta is situated, the summer temperatures frequently reach 100° F in the shade, while in the winter they drop below zero, with severe frosts continuing for weeks at a time. The elevation is 5500 feet, and the rainfall 10 inches, with no rain falling from April to December.

The few seeds received were planted at the Department's Plant Introduction Garden, near Chico, Calif. A small number of seedlings were grown from them and when these fruited one of them bore excellent smooth-skinned nectarines. In accordance with the usual practice, this good tree was given a plant introduction number (P. I. 34685) and later, after it had continued to bear good fruit under test, was named the "QUETTA" nectarine after the place of its origin.

This California-grown nectarine has a smooth skin, sweet flesh and is as finely flavored as a high-grade peach.

The Quetta nectarine as grown at Chico, Calif., is a vigorous tree with a compact head. It is a comparatively early bloomer, and makes a handsome ornamental when the mass of flowers is at its best. The fruit is large for a nectarine, measuring from two and one-half to two and three-fourths inches in diameter. The color is yellowish green, speckled and irregularly streaked with carmine and, where not too much shaded, the fruit becomes almost solidly covered with an attractive mottled red. Although sometimes slightly roughened in spots by insect injury and weather, the skin is fairly smooth and not easily broken, which adds to the shipping quality of the fruit.

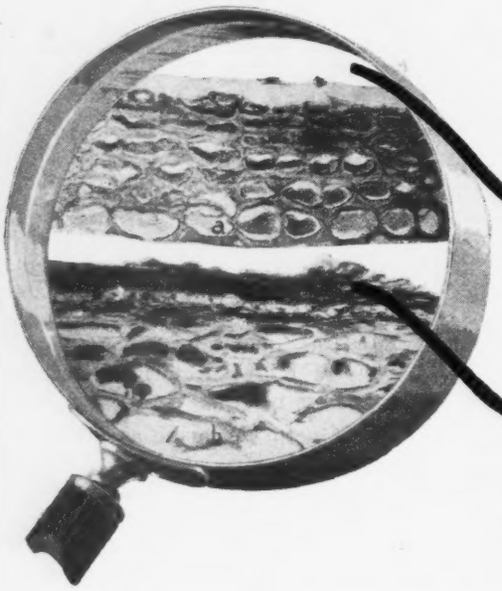
The flesh is creamy white and streaked with red near the brown pit to which it clings. Its juiciness, moderately fine texture and firmness,

(Continued on page 37)

Why Risk RUSSET *Wh*

THIS SPRAY SCHEDULE INSUR

Varieties like Jonathan, Grimes, Delicious, Golden Delicious, Baldwin, Stayman and Ben Davis which are susceptible to Liquid Lime Sulfur russet represent the greatest loss to growers. Experience has shown that Liquid Lime Sulfur can cause more dollars and cents loss to apple orchards than scab. Therefore, why take any more chances with this injurious spray material? Reduce the amount of culls in your apple crop next year . . . grow more A-Grade apples of fine color and finish by spraying with Sherwin-Williams Dry Lime Sulfur.



GROW MORE A-GRADE APPLES

FINE FINISH LAYER

This is an actual microscopic cross-section photograph showing the skin of an apple with fine smooth finish. Note the smooth unbroken top layer showing the skin of the apple. S-W DRY LIME SULFUR will produce this fine smooth finish.

RUSSET LAYER

An actual microscopic cross-section photograph showing the corky skin tissue caused by russet. Note the dark corky layer showing how russet ruins the smooth skin of the apple. Caustic Liquid Lime Sulfur will cause this corky skin tissue known as russet.

THE SHERW WILLIAMS

New

DRY L SULFUR

1936 APPLE SPRAYING SCH

NO RUSSET	NO FOLIAGE INJURY	
SAN JOSE SCALE	DELAYED DORMANT	12 to 15 lb Sulfur
SCAB	CLUSTER-BUD OR PINK	3 lbs. Dry L
SCAB	CALYX	2½ lbs. Dr and 2½ Lime
SCAB	ONE WEEK 10 DAYS A CALYX	2 lbs. Dry L 2½ lbs. H
SCAB	THREE WEE AFTER CA	2 lbs. Dry L 2½ lbs. Hy

THESE DILUTIONS AR 50 GALLONS
Add 1½ lbs. of Sherwin- Arsenate of L gallons of water when nece

Write for a copy of Sherwin-Williams No Russet—No Scab Spraying Schedule for apples.

THE SHERWIN-WILLIAMS CO.
Insecticide Department
101 Prospect Ave. Cleveland, Ohio

SHERWIN-WILLIAMS
SPRAY AND DUST MATERIALS

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LE INSURES FINE COLOR • FINE FINISH

SHERWIN-WILLIAMS CO.

New

DRY LIME SULFUR

PPLE SPRAYING SCHEDULE

NO FOLIAGE INJURY	NO SCAB
LAYED ORMANT	12 to 15 lbs. Dry Lime Sulfur
USTER-BUD PINK	3 lbs. Dry Lime Sulfur
LYX	2½ lbs. Dry Lime Sulfur and 2½ lbs. Hydrated Lime
HE WEEK DAYS A LYX	2 lbs. Dry Lime Sulfur and 2½ lbs. Hydrated Lime
REE WEE TER CAL	2 lbs. Dry Lime Sulfur and 2½ lbs. Hydrated Lime.

NS ARE TO 50 GALLONS OF WATER.
Sherwin-Williams Arsenate of Lead to 50
en necessary.

The Original Dry Lime Sulfur U. S. Patent No. 1264908, Jan. 29, 1918. Reissue Patent No. 14980, June 22, 1920.

SHERWIN-WILLIAMS SPRAY AND DUSTING MATERIALS

Apple flea weevil, the chief cause of this condition.

WINNING THE FIGHT AGAINST APPLE FLEA WEEVIL

(Continued from page 13)

native to America which did not assert itself as an apple pest in Ohio until about 1907, shortly after the sod mulch method of culture came into vogue. Incidentally, it may be pointed out at this time that flea weevil is never troublesome in orchards in which clean cultivation is practiced consistently. On the other hand, partial cultivation seems to be of little benefit inasmuch as a few square feet of sod or debris near the trunk of the tree provides ample hibernating facilities for a sufficient number of beetles to cause significant damage the year following.

As just intimated, the apple flea weevil passes the winter in grass and debris beneath the tree. There is a tendency for the adult beetles to collect somewhat near the tree trunk, although they may be found in any part of the orchard if a heavy sod covers the ground. Some of the beetles may seek their winter hibernating quarters as early as late August and by October 1 very few are to be found abroad.

As soon as the buds begin to expand in the spring and the tips of the young leaves appear, the beetles leave their winter quarters and settle on the buds, where they begin to feed on the leaf tissues. If the orchard is heavily infested, the developing foliage may be destroyed almost as rapidly as it develops, particularly in the interior of the tree. On one occasion, in the spring of 1935, I observed as many as 13 beetles on a single bud cluster. Five or six beetles per bud cluster is no uncommon sight.

After the foliage is well developed, the egg is laid in the mid-rib or in one of the larger veins and the young larva which hatches therefrom feeds on the interior of the leaf, ultimately forming a blotch-like mine. There is but one brood per year.

The development of an outbreak of apple flea weevil in an orchard is insidious rather than spectacular in nature. At the outset, a few tiny holes are noticed, particularly on water sprouts and in leaves in the interior of the tree; also some mines are to be seen occasionally. As the insect gradually increases in abundance from year to year, the two types of damage become more pronounced until, finally, practically all the foliage is involved. Later, the lower branches die, and the entire tree becomes so weakened that the quantity and quality of production diminish to the point where the orchard becomes unprofitable.

It has been known for some years that absolutely clean cultivation is an effective and dependable control measure for the apple flea weevil. Many orchardists, however, do not favor this type of orchard management; moreover it is impractical of application in some of the hillier orchards. For these reasons there has been an insistent demand from many orchardists that a type of control other than clean cultivation be developed.

The first method to suggest itself was that of burning the debris in which the beetles were hibernating, either in the fall or in the spring of the year. It became apparent at an early date that surface burning was of little or no avail. Indeed, orchard blocks so treated seemed to fare worse than unburned blocks because the destruction of the surface debris allowed the heat rays of early spring days to penetrate to the hibernating beetles, causing them to emerge at an earlier date than normal. Thus the tender, developing foliage suffered more severely than did the foliage of trees in unburned areas which was permitted to get a little start before the beetles emerged.

Power burners of different sorts were next utilized. Last spring, in co-operation with the Bureau of Agricultural Engineering of the U. S. D. A., a final effort in burning was made. Blast torches in which the heat from the intense blue flame was confined under a metal hood were slowly operated beneath the trees. Sometimes as much as 30 minutes were spent beneath a single tree. Unquestionably, many beetles were destroyed, but enough escaped to thoroughly damage the foliage in all of the blocks of trees so treated.

For several years, both in the field and in the laboratory, work was conducted in an endeavor to develop a satisfactory spraying procedure for the control of this pest. During the course of these studies, practically all of the stomach poisons and contact sprays were put under trial, but the results were not very encouraging. The fact was developed during this interval that if lead arsenate is added to the pre-pink and the pink sprays, a significant degree of good will be accomplished, particularly if the under side as well as the upper side of the leaves is coated. Even with most careful work, however, too many beetles escaped and the demand remained for a satisfactory spraying control.

The advent of the fluorine sprays proved a genuine boon to the orchardist who is contending with an outbreak of the apple flea weevil because it very soon became apparent in laboratory experiments and exploratory small-scale field trials that materials of this sort were peculiarly efficient in combating insects of the group to which the flea weevil belongs. On the basis of these preliminary findings, an exhaustive test was conducted in 1934 in the orchard of E. B. Blakeslee at Medina, Ohio, which was repeated in 1935 both at the Blakeslee orchard and in the orchard of Alban and Wood at Jackson, Ohio. On the basis of the work of these two years it can be stated that the following formula gave very satisfactory control:

Dutox or Kalo spray	5 lbs.
Flotation sulphur	8 lbs.
Goulac	3 ozs.
Water	100 gals.

In all instances the trees were given a delayed dormant application of lime-sulphur and two pre-blossom treatments were made for flea weevil control. The first was made during the pre-pink period and the second was applied when the blossoms were in the full pink stage. Not only was damage by flea weevil reduced to a

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NEW YORK MEETING

(Continued from page 20)

program by Dr. F. P. Cullinan who talked on trends in peach growing. He dwelt on the latest developments in culture, varieties and market trend.

The important export situation was discussed by R. G. Phillips, secretary of the International Apple Association.

Millard F. Hincher of Morton, was elected president of the society, succeeding Lawrence Howard of Kinderhook. The latter took a place on the executive committee. The remainder of the committee is composed of Albert E. Weirich, Adams Basin; Ewart G. Cowper, Newfane; Wessel Tenbroek, Jr., Hudson; Jay Gelder, Chazy, and Bruce P. Jones of Hall, New York. The vice-presidents now include Herbert P. King, Trumansburg; H. H. Brown, Monsey; George A. Morse, Williamson, and J. Roe Stevenson of Cayuga, New York.

Roy P. McPherson of LeRoy was re-elected secretary-treasurer, a position he has held for several years. His fine work in the past merited his re-election.

A commercial pack exhibit and contest and a boys' exhibit and judging contest were additional features of the meeting.

Lawrence Howard, Kinderhook, 1935 president of the New York society.

Minn. Membership Increase

MEMBERSHIP during 1935 in the Minnesota Fruit Growers Association was three times larger than during the previous year. We are now almost the largest of the 34 organizations affiliated with the Minnesota State Horticultural Society. We have members in Illinois, Indiana, Iowa, Kentucky, North Dakota, Pennsylvania, Wisconsin, Alberta, British Columbia, Manitoba and Ontario. Our president, Ben F. Dunn, was elected vice-president of the state horticultural society at the last annual meeting in November, 1935.

During the past year the association was instrumental in securing passage of an amendment to the law which established the legal measure for a bushel of apples, so that the Minnesota law now conforms to the U. S. Standard Container Act. A bill to regulate roadside markets is likely to come before the next regular session of the legislature. The one considered at the last session did not come to a vote. A matter of general interest is the legal measure for berries. Most members of the association who have expressed their opinions seem to feel that the present legal net weight for strawberries (20 ounces) is too high, and that the legal measure should be by volume rather than by weight. The federal regulations are by volume, which means a berry box must be full, but no weight is specified.

The University of Minnesota Fruit Breeding Farm has some new productions coming along that are of real merit. The Red Lake currant is proving to be way ahead of all other varieties. A still newer currant, Minn. No. 70, is claimed by those who have fruited it to be better than Red Lake. The new plum, Minn. No. 83, is smaller than most of the named Minnesota hybrids, such as Superior and Underwood, but it has the crisp flesh of varieties like Kaga and will be found good for canning. Apple No. 423 will beat Duchess and Red Duchess on color for the early market every time and for this reason brings better prices. Apples Nos. 790 and 1007 are outstanding new late winter apples of good quality and the fruit hangs tight to the tree. All these and several other very desirable varieties will be on the 1936 membership premium list.

J. D. WINTER, *Sec'y*,
St. Paul.

Dr. A. J. Heinicke, head of the Horticulture Department of Cornell University, snapped just before he talked at the New York meeting.

Maryland Head Resigns

DR. J. H. BEAUMONT, head of the Department of Horticulture of the University of Maryland and horticulturist of the experiment station, has resigned to accept the position of horticulturist and plant physiologist of the agricultural experiment station in Hawaii. His resignation became effective January 1, 1936. This announcement was made by Dr. H. J. Patterson, dean of the College of Agriculture and director of the Maryland Experiment Station. He stated that Dr. A. L. Schader will serve as head of the Department of Horticulture until a successor to Dr. Beaumont is chosen.

Before coming to this state in 1932, Dr. Beaumont held a similar position in North Carolina. Prior to that time he was connected with the University of Minnesota. He is a native of West Virginia and received his under-graduate training at the University in that state.

A. F. VIERHELLER, *Sec'y*
College Park.

CODLING MOTH CONTROL

(Continued from page 9)

will show incompatible relationships. Who, then, is brave enough to make specific recommendations for general usage? It is obvious this detail must be left to investigators familiar with local conditions. It is also clear that the grower must familiarize himself to a greater degree than before concerning his specific problems, that he may intelligently buy and use satisfactory combinations of spray materials.

Doubtless the need for more effective codling moth control and the resulting greater usage of lead arsenate hastened the establishment of residue regulations, a feature which constitutes a major problem in many growers' spray program. This complication has been added to the list within the past 10 year period. To improve the effectiveness of arsenate of lead, stickers, spreaders, and various oil combinations were developed. Coverage, persistence of the spray and control resulted. Then came the residue removal problem, arsenic first, then lead. Vigorously pursued fruit washing studies carried on by chemists, horticulturists and entomologists have made it possible for growers to reach existing tolerances in most sections, although difficulties have occurred in areas where the codling moth is controlled with great difficulty or where growers have complicated their poison deposit in a manner that has prevented satisfactory removal. At this time it appears that further progress and improvements in washing methods and technique will be accomplished with difficulty. There will be no immediate and outstanding improvements. Further progress in this connection will be the product of much time, energy and study. Appreciable reduction of tolerances, particularly lead, will cause much difficulty to both the growers and the apples themselves. The fruit in many sections is being subjected to extreme conditions in the washing treatment. The remaining margin of safety, insofar as the fruit is concerned, is slight. The growers' margin in many sections is now non-existent.

Entomologists and chemists have been devoting a great deal of time and energy during the past four or five years to the devising and testing of many chemical combinations, for the purpose of eliminating the poison of greatest concern—lead—from our codling moth spray program. These chemical combinations can be counted by the hundreds, and include large groups of organic and inorganic poisons. A testing-out process, both in the laboratory and in the field or orchard, has reduced the possible ma-

(Continued on page 33)

STATIONARY SPRAYING

(Continued from page 12)

(2) No suitable place for pipes is another criticism. Placing the pipes in the row, on the surface of the ground, has been very satisfactory in grass mulch orchards in Indiana. Small sections of lines which interfere seriously with orchard work can be buried—the rest left on the surface. One block of 123 acres in Indiana was piped every fifth row, depth 18 to 36 inches, with drains at low points. Total cost per acre, exclusive of pumps, power units and tank, was $29.71. The cost of burying the pipe alone was $4.93 per acre, using ditching machine at 30 cents per rod.

(3) Stationary spray plants waste spray material. Very true! It is difficult to manage a stationary plant and not lose 500 or more gallons per day. The owners of one 225-acre system estimate this loss at four per cent of the total gallonage.

(4) Stationary plants are subject to frequent damage from freezing. Hook up a small air compressor and air tank of suitable size. Blow out lines used during the day with air. The entire system of pipe lines at the Purdue plant at Lafayette has only one drain plug. The entire cost of the blow-out system was $25 with used compressor and tank, and new pipe and valves. Blow out a second time in 30 minutes when possible. Underground systems are not entirely safe against freeze injury unless drained or blown out.

(5) Spray material precipitates in pipes. Size of main lines depends on length and number of gunmen. One 223-acre plant in Indiana has fine field pressure with one-and-one-half-inch mains, three-quarter-inch laterals, and uses 12 to 14 gunmen. Keep pipe sizes as small as possible to increase speed of flow and avoid setting out of spray material. Poor pressure is often due to under-capacity pumps and insufficient power. Pressure loss of 40 to 50 pounds can be expected from hose faucet, through 125 feet of hose, to base of gun. Data on actual precipitation losses is not available. A 10 H.P. motor and 33 G.P.M. pump are required to service four gunmen at our Bedford plant.

(6) Pipes scale badly on the inside over winter. We have almost eliminated this by filling the lines with used crankcase oil *as soon as the last summer spray is applied.* Leaving this in the lines for three or four days and blowing it out and storing for use the next season is by far the best plan.

(7) Windy weather stops work with a stationary plant. Not much more so than with portable outfits. It means a return trip to finish with either type of equipment if a thorough coverage is to be obtained.

(8) Pulling 125 feet of spray hose is a man-killer. Our figures show that a low-priced man used as a hose carrier will increase speed of coverage enough to cover this added cost. An important added gain is reducing the heavy labor of the gunman, thus obtaining a better spray job. The use of a three-eighths-inch hose instead of one-half-inch is being quite generally adopted at the present time. Don't expect to work a gunman over eight hours and pull his own hose. You lose!

Lack of proper supervision may be partly the cause of poor control with stationary plants. Too often the man who formerly supervised the portable spraying now does the mixing at the stationary plant.

(9) Spraying with large portable rigs is less expensive. Records at the Purdue Experiment Station at Bedford for the period 1931-1934 show a total cost of 59 cents per 100 gallons (labor, power, depreciation and interest on investment) for stationary spraying and 74 cents per each 100 gallons for portable spraying. The portable rig was equipped with 250-gallon tank and 16 G.P.M. pump and close overhead water supply, but, of course, does not compare in size to many of the portable rigs now in use. On the other hand, the stationary plant was large enough to have handled the entire 80-acre block instead of three-fifths of the acreage, which naturally somewhat increased the cost per 100 gallons in this area. In addition, the first installation of stationary equipment serviced the hilly, rough part of the orchard. In years such as 1929, with constant rain from pink to calyx, this area was almost impossible to keep adequately sprayed with portable rigs.

Conclusions

It is very evident that there is a wide difference of opinion as to the results in pest control with the stationary method of spraying. Men who have had plenty of first-hand experience in operating both portable and stationary plants have had widely different results. Under their conditions and methods of operation there is no question but what they have given us a true picture of their results.

Anyone considering changing from portable to stationary spraying should consider the drawbacks of both methods very carefully before making this new investment and scrapping the portable rigs.

SPRAY SERVICE

(Continued from page 16)

New York service fitted him for the position he took over a few years later as extension plant pathologist at Ohio State University.

When Dr. Pierstorff took his position at Ohio there had been some work on spray service and this work was the first to take radio as its medium of dissemination. This first use of the radio was undertaken in an experimental way.

About six years ago the co-operation of two of the larger Ohio broadcasting stations was obtained in placing spray service programs on their sustaining series. These are station WLW at Cincinnati and station WTAM at Cleveland. The stations are ideally located to cover the fruit belts of the state. Many growers in surrounding states take advantage of the spray service programs when they are able to contact the stations broadcasting the information.

Those growers who are able to receive the broadcasts benefit in obtaining accurate advice in spraying for the various pests, and gain a great advantage in overcoming the time factor which is of such importance in the spray application procedure.

In the early days of the spray service the use of radio was not possible due to the lack of organized co-ordination between the specialized observers in the field and the pathologists and entomologists at the colleges.

The operation of the Ohio system as it is used today gives an interesting picture of another line of activity which brings greater advantage to the grower in the constant fight against the pests attacking his fruit.

Photographs of the various stages of bud development are tinted in natural colors and are made into a booklet. There are eight colored photographs in each booklet, giving the following stages: green tip, early delayed dormant, delayed dormant, late delayed dormant, early pre-pink, pre-pink, pink and full pink.

These booklets are prepared by C. E. Wilson, extension specialist in visual education, under the direction of J. E. McClintock, extension editor, and Dr. Pierstorff. In 1935 there were 40 of these booklets made which amounted to 320 tinted photographs.

These booklets are sent to men in strategic points throughout the fruit districts. The men may be grow-

(Continued on page 44)

OUTSMART CODLING MOTH

(Continued from page 10)

caught. One of the bands used extensively during the past century was the so-called "hay-rope band." In giving suggestions for the use of these bands, one of the early entomologists advised that the trunk of the tree should be kept free of old rough bark, "so as to give the worms no other place of shelter" and that "the ground itself should be kept clean from weeds and rubbish."

In reviving many of these practices other than spraying, growers are not, however, returning to the horse and buggy era, but are working toward a well-balanced program of control, in which each control method of practical value is given its appropriate emphasis. Brief mention will be made of a few of the practices, other than spraying, most commonly used in controlling the codling moth.

Perhaps the most important one of these methods is the use of bands, which takes advantage of the habit of the full-grown worms of seeking protected places to spin their cocoons. If their usual cocooning quarters under rough bark, in decayed pruning stubs, in coarse debris on the ground, or in similar places, are largely eliminated, one-third to one-half or more of the worms will be forced to seek shelter under the bands. The removal of the rough bark and the clean-up of debris, essential in preparation for banding, in itself eliminates many hibernating worms. The proper use of bands prevents many of the first-brood worms from transforming into the moths that produce the second brood which is often so destructive; later in the season the bands trap many worms that would otherwise go through the winter, thus reducing the carry-over for the following season.

Practical large-scale field experiments to determine more exactly the value of clean-up and banding, carried on during the past two years in southern Indiana by Messrs. L. F. Steiner and A. J. Ackerman, of the Bureau of Entomology and Plant Quarantine, U. S. D. A., have indicated reductions of about 50 per cent in worm injury. Similar results have been reported by state workers in other localities.. An important feature of the experiments has been the use of the chemically treated band developed by E. H. Siegler of the Bureau of Entomology and Plant Quarantine in cooperation with numerous state and federal workers. This type of band has the practical advantage of eliminating the need for hand labor during the growing season, when available competent orchard labor is fully occupied with other activities. This factor, and the urgent need for control measures other than spraying, have been responsible for the extent to which chemically treated bands have come into use.

The importance of the packing shed as a source of infestation has been realized by growers more fully in recent years. Enormous numbers of worms may be carried into the packing shed with the fruit at harvest time. These leave the fruit during the course of the grading and packing operations, and find cocooning quarters within the shed. Under the favorable hibernating conditions existing in most packing houses, a high percentage of these worms survive and turn into moths the next season—often during periods when few moths are emerging under out-of-door conditions, when the grower is not expecting a flight of moths, and when the fruit is not well protected by spray material.

An outstanding illustration of the value of screening the packing shed to prevent moth emergence has been recorded by J. J. Davis, of the Indiana Agricultural Experiment Station, in an orchard in southern Indiana, where the enclosing of the entire shed with cloth, at a seasonal cost of $23, resulted in one year in the capture of more than a quarter million moths. Is it necessary to inquire whether preventing these moths from reaching the orchard was easier than it would have been later to fight the resulting worms in the orchard?

Boxes used in the orchard may also be a source of many moths, particularly in the case of those used by associations or large handlers of fruit. In such cases, boxes used to handle wormy fruit in a heavily infested orchard may find their way the next time to an orchard comparatively free from infestation, with obvious consequences. One grower, without realizing the consequences, stored such boxes in a young orchard just coming into bearing and as a result turned loose in that orchard at least 100,000 moths, which seriously intensified his control problem.

Leroy Childs, of the Oregon Experiment Station at Hood River, tells of a method for treating infested boxes with steam, which was developed by the Apple Growers' Association of Hood River Oregon. It is believed that the sterilization of boxes has been of considerable assistance in the control of the codling moth in that area, and many growers now refuse to permit unsteril-

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CODLING MOTH CONTROL

(Continued from page 29)

terials to relatively few in number.

In dealing with this situation, it must be remembered that it is necessary to employ a chemical or combination of chemicals less harmful to the human body than lead or arsenic, and it is this severe handicap which prevents the use of many potent poisons in the control of an insect of the character of the codling moth. Likewise, it is, of course, necessary to devise a poison spray that is also non-injurious to fruit and foliage and one that is, at the same time, compatible with certain fungicides now employed, in some districts at least, for the control of various plant diseases.

Experience gained by past investigations has shown that sprays behave quite differently, one fruit section with another. Climatic differences affect various spray materials differently, particularly in their relationship to the occurrence of injury to the sprayed fruits or trees. It becomes necessary that all new or promising materials be tested for several years in order to determine their merits and limitations before the findings can be safely passed on to the grower. It can be seen, therefore, that the development of a spray capable of meeting the necessary requirements is no small contract and a problem that will doubtless require years to solve, as was the case in the development of lead arsenate.

The list of promising substitutes for lead arsenate is not great and it appears quite probable that in the event one or more of the non-lead arsenicals measure up to requirements, it will be necessary to employ oil or some other equally or more effective binder in at least some of the applications.

Organic poisons (derived from plant sources) tested at the Hood River, Oregon, station include nicotine-oil, nicotine-tannate, nicotine-bentonite, pyrethrum, cube root and derris root. This group of poisons has been used alone in a variety of schedules and number of applications. They have also been combined with oil in certain tests. In our tests nicotine-bentonite used in 10 covers at a dilution of six pounds to 100 gallons of water resulted in control equal to arsenate of lead employed in five cover sprays. The arsenate was about five times as effective where nicotine-bentonite was used in the regular schedule. Arsenate of lead was found to be from five to eight times as effective as the other materials in this group, the apples in some of these tests receiving as many as 10 cover sprays. The cost of such treatments was found to be prohibitive.

(Continued on page 35)

AT OPENING OF INDIANA MEETING

Famous grower of Vincennes, R. A. Simpson (left), meets Prof. C. L. Burkholder of Purdue University at the opening of the Indiana meeting on January 21 in Indianapolis. Officers elected for 1936 are Homer J. Coffing, of Covington, president, M. S. Troth of Orleans, vice president, and Everett Wright of Lafayette, secretary-treasurer.

STATE HORTICULTURAL NEWS

(Continued from page 28)

Wisconsin Seeks Oldest Living Apple Tree

WHERE is the oldest living apple tree in Wisconsin? Charles L. Hill, chairman of the Department of Agriculture and Markets, suggested at the annual banquet held in connection with the convention of the Wisconsin State Horticultural Society and the State Garden Club Federation that the society make an effort to find the oldest living apple tree in Wisconsin. He suggested this would be very interesting and surprising results might be obtained.

Mr. Hill has on his farm some old apple trees and has heard of some in southeastern Wisconsin that are almost 100 years old.

The Board of Directors voted that an effort be made to find the oldest living apple tree if the co-operation of the State Historical Society could be obtained. Dr. J. Schaefer of that society stated he would be very glad indeed to help us in verifying any data submitted and in obtaining the information.

We are therefore asking our members to send in to this office at once any information they may have in regard to the oldest living apple tree. The information desired is as follows: Where is the tree located? How old is it? What proof can be obtained as to the accuracy of the age of the tree?

A beautiful certificate will be presented to the person awarded the honor of having the oldest living apple tree growing on his property. H. J. RAHMLOW, *Sec'y*, Madison.

Citrus Work Expands

INITIATION of an expansion program in citrus research work at the Citrus Experiment Station, Lake Alfred, Fla., is announced by Dr. Wilmon Newell, director of the Florida Agricultural Experiment Station system. Dr. A. F. Camp, for the past eight years head of the Department of Horticulture at the main station in Gainesville, has been appointed horticulturist in charge of the citrus station, and is moving to the Polk County headquarters.

The plan calls for institution of nutrition and soils work, irrigation studies, and further research on utilization of citrus by-products. The station now has about 80 acres of land under cultivation, and it is planned to develop 50 acres more, 40 of which were donated to the state some months ago by the Florida Agricultural Research Institute.

The Citrus Experiment Station was established in 1920, and since that time experiments concerning citrus diseases, insects, propagation, cover crops and chemistry have been prosecuted. These will be continued under the new setup.

Employees already at the citrus station, who will remain there, include John H. Jefferies, superintendent, Dr. B. R. Fudge, associate chemist, W. A. Kuntz, associate plant pathologist, and W. L. Thompson, assistant entomologist.

FLEA WEEVIL

(Continued from page 26)

point of non-commercial significance, but apple scab likewise was satisfactorily controlled.

There still remains some additional work to be done on the problem of flea weevil control, particularly with respect to the possibility of substituting other brands of colloidal sulphur in the formula for the one brand we were able to utilize. The same holds for other materials in which fluorine is the principal toxicant. It seems desirable, however, at this time to set forth our findings to date in order that those orchardists who are contending with the flea weevil problem have access to our results. Those who utilize the formula should bear in mind that spraying the under side as well as the upper side of the leaves is absolutely essential to success.

CODLING MOTH CONTROL

(Continued from page 33)

During recent years the following mineral or inorganic insecticides have been tested. These include several brands of calcium arsenate, zinc arsenate, zinc arsenite, manganar, barium fluosilicate and natural cryolite. These materials have been used alone and in certain tests combined with mineral and fish oil. During the past two years, so-called buffers or safeners, such as zinc sulphate and aluminum sulphate, were used in the various arsenical combinations for the purpose of preventing injury, whereas in 1933, these spray materials were used alone, at which time the calcium and zinc arsenicals caused noticeable leaf injury and some defoliation. This was particularly noticeable after the first fall rain occurred.

In our tests of the past two seasons, this group of arsenic-containing sprays to which the safening materials had been added, caused no injury to fruit or foliage and because of this fact, are worthy of further study. In connection with control, certain tests have approached results obtained with the standard treatment, arsenate of lead. Improvements involving more lasting coverage and increased spray deposit with arsenic, combined with either zinc or calcium, may be the answer to the lead problem. As a general statement, it appears that further experimental work is necessary before it would be wise for growers to use these materials other than in a limited way.

The fluorine compounds have produced results rather similar to control obtained with zinc and calcium arsenate, that is, somewhat inferior to lead arsenate. It appears that the fluorine sprays must employ mineral or fish oil stickers or binders to give them the necessary adhesiveness to bring about control. In such combinations, fluorine removal becomes difficult, which constitutes a serious washing problem, particularly in fruit sections equipped with acid-type washers.

Investigators are directing more attention to the codling moth now than at any other time since the insect became a pest in this country. Its life history and habits, reactions, and responses to all types of stimuli, including lights in light traps, baits in bait traps, repellents, sanitary measures in the orchard, biological control, as well as spraying tests already discussed, are some of the major features of this work. The codling moth has demonstrated itself to be one of the orchardists' most disconcerting foes. To date, this insect has been able to withstand the onslaught of science and although forced to retreat before the spray gun of the thorough orchardist, it continues to remain a threat capable of marshalling great strength in a short time in most of the orchards of the land. To successfully carry on the battle, lead arsenate has been the most important and reliable ammunition. At this time substitutes have not demonstrated sufficient trustworthiness to delegate to them the important job of holding the fort.

Unusual Combination

Lawyer and orchardist—an unusual combination of vocations; but such is the record of John E. Rice, well-known orchardist and lawyer of Marlboro, Mass. Mr. Rice was the principal speaker at the banquet of the Massachusetts Fruit Growers Association. The banquet was one of the features of the annual meeting of the association held at Worcester, January 8-10. Mr. Rice has approximately 200 acres in orchard near Marlboro.

Prof. W. P. Flint of the Illinois Natural History Survey and Experiment Station told the Illinois State Horticultural Society, while presenting the paper he prepared in collaboration with Dr. M. D. Farrar, that when the codling moth second brood seems to smother the orchard a spray of a nicotine-oil combination will control the worms, the eggs and the adults

ONE OF NEW YORK'S ORCHARD KINGS

Grant G. Hitchings, operator of one of the largest orchards in the Empire state, was accompanied to the New York State Horticultural Society meeting at Rochester by Mrs. Hitchings.

Notes and News from the Field

GRAPE growers in the Hudson Valley have been able to cope with disease and insect pests for several years by using one or two sprays, but last summer they were forced to resort to frequent, thorough spraying in controlling black rot, according to Dr. W. D. Mills, assistant extension plant pathologist at Cornell University.

While speaking before the meeting of the New York State Horticultural Society, P. J. Parrott of the Geneva Agricultural Experiment Station, told growers that red mite is controlled by any spray solution containing three per cent oil emulsion.

Dr. E. L. Overholser, head of the Department of Horticulture of Washington State College, told growers at the New York State Horticultural Society meeting that care should be practiced in the handling of apples from harvest to market, as bruises will intensify the residue removal problem.

A solution to the pressing marketing problem is to make the consumer learn to use apples, the various ways to use them and to create a consumer desire for apples. This was advanced by the 1935 president of the New York State Horticultural Society, Lawrence Howard of Kinderhook.

Sheldon W. Funk, grower of Boyertown, Pa., appearing on the program of the New York society, stated that he follows the thinning operations according to the crop and the market that he thinks will be present at harvest.

If a question arises as to the time to pick Cortlands and McIntosh, it is probably best to pick the red Cortlands before the McIntosh, in the opinion of Dr. A. J. Heinicke, head of the Department of Horticulture at Cornell University. His opinion was voiced at the New York society meeting.

The peach requires a certain amount of cold temperatures to come out of the dormant stage. In 1932 the winter was so mild in Georgia that the trees did not produce a good crop due to the lack of a normal dormant season. This factor was brought out in the talk of Dr. F. P. Cullinan of the U. S. D. A., which he gave before the New York society, and was particularly impressive as most growers in the northern sections fear injury from lower temperatures.

Joseph Oskamp, extension horticulturist at Cornell University, emphasized the need for proper air drainage on the orchard site. He stressed this factor of site selection while talking before growers at the meeting of the New York society.

According to G. S. L. Carpenter, orchard manager of Hagerstown, Md., one bright spot in the export situation is the French market, which expanded with good prices during the past years. On the stage of the hall in which the program of the New York meeting was held, Mr. Carpenter showed a display of fruit advertising posters collected from all parts of the world.

"Growers must solve the retail marketing problem or it will dissolve them." This striking statement was made during the talk of Lawrence Howard, 1935 president of the New York State Horticultural Society, before the recent annual meeting of that group held in Rochester.

The New England Apple Institute was formed in 1935 by growers in the Hudson Valley and during the past marketing season grower-members controlled more than a million and a half bushels of winter storage apples. This fact was brought out in the talk by E. Stuart Hubbard, grower and commission merchant of Poughkeepsie and New York City.

Pruning and cleaning up the orchard will aid in the control of codling moth, for in addition to preventing places of overwintering, the practice of judicious pruning will make it easier for sprays to penetrate the trees, said P. J. Parrott, head of the entomology department of the New York Experiment Station at Geneva, while addressing the New York Horticultural Society meeting.

QUETTA NECTARINE

(Continued from page 23)

combined with its sprightly, mildly subacid to sweet flavor, give it excellent quality. It also develops a rich aroma when fully ripe. Most of the crop ripens during the month of July.

This new nectarine, having all the qualities of a good peach, and the added advantage of a smooth skin, showed promise of finding favor with that part of our American public that likes to eat its fruit out of hand.

Having shown its value when grown at the Department's Plant Introduction Garden at Chico, it was propagated and extensively distributed to all the peach growing states in the Union except Maine, New Hampshire and Rhode Island. The first general distribution was made in 1914 and following that, distributions were made every year until commercial nurseries began listing it in their catalogs.

In the Middle West and eastern part of the United States it has made an excellent growth, and has produced good crops of fruit as far north as Hamburg, Iowa; Clinton, Ill.; and Pittsburgh and Bridgeville, Pa. On the northern border of its culture the buds, and sometimes the trees, have suffered severe winter injury during seasons when extreme weather conditions prevailed. During the extreme drought of the 1934 season the Quetta trees were killed at Hamburg, Iowa. In contrast, the peach varieties growing in these sections have not suffered as severely from the cold and drought, indicating that apparently this nectarine is not as hardy or as drought resistant as the peach. However, in Kentucky its fruit buds were reported to have withstood the low temperatures of 1932 and 1934 when the crop from many varieties of peaches was a total failure.

When grown as far north as Storrs, Conn., the fruits have not matured properly. Its southern limit is through southern Arkansas and northern Mississippi, Alabama and Georgia. On the Pacific Coast it has apparently found ideal conditions for its growth in the Sacramento and San Joaquin valleys of California.

A nectarine variety has been propagated under the name of *Persian* and has been distributed in some of the middle western states. *This variety is identical with Quetta.* One grower in this section has a number of trees in his orchard all of which have produced good crops of large, well-colored, high-quality, clingstone fruits and points out that they are growing in the same orchard with trees of the Hunter nectarine, a variety which has fruited heavily but failed to size up and was quite susceptible to brown rot.

The commercial production of nectarines had practically ceased in California when this new nectarine began to attract the attention of the fruit growers. One of the earliest plantings was made at Vacaville, Calif., and excellent returns were received when the first crops were marketed in Los Angeles. In August, 1925, a small shipment of seven crates of Quettas from Yuba City, Calif., was included in a carload of plums consigned to New York City. These unknown nectarines arrived in good condition and brought $1.60 a crate as compared to $1.45 for Giant and $1.70 for Grand Duke plums, fruits with which buyers were well acquainted, thus demonstrating that in addition to its high quality and handsome appearance, this new nectarine had the ability to stand long distance shipping, the limiting factor with most nectarines.

A planting of 80 acres was started at Vina, Calif., in 1924 and new

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ENTOMOLOGISTS UNDER THE LENS

While giving their own microscopes a vacation in order to attend the Rochester meeting of the New York State Horticultural Society, P. J. Parrott, entomologist at the Geneva (N.Y.) Experiment Station (left) and C. R. Crosby, extension entomologist at Cornell University, were caught and placed before the lens of American Fruit Grower's staff photographer.

AIM FOR THE "DANGER ZONE"

"AIM for the danger zone!" In the war against orchard pests, this order to men on the nozzle end of spray hoses may soon rank in importance with the famous instructions of revolutionary days, "Don't shoot until you see the whites of their eyes."

Charted during recent studies by the Michigan Agricultural Experiment Station, the danger zone, where pests flourish if proper spraying is not practiced, has been found to be the center top of a tree. Unless this area is thoroughly sprayed, according to a report issued by the Michigan station, satisfactory control of insect and fungous pests will not be obtained and spray schedules or materials will be unjustly blamed.

"There is each year much complaint on the part of the fruit growers about the failure of their spray applications to afford satisfactory control of insect and fungous pests. Sometimes criticism is directed against the insecticides or fungicides that are used, the thought being that they are not of standard strength; sometimes it is directed against the spraying schedule that is recommended by the experiment station. A study has been made to determine why there is often so much difference between the results obtained by experiment station investigators and those obtained by growers attempting to follow their recommendations.

"It has been found that in most orchards where standard materials and the recommended schedules have been employed and satisfactory control has not been obtained, most of the blemished fruit comes from the center tops of the trees or that entrance to the fruit is obtained by insect or fungus through the side facing the tree's trunk. This is evidence that there has not been thorough coverage with spray material though perhaps adequate quantities have been applied. What is required, principally, is more care in making the spray applications.

"THEY SHALL NOT PASS"

(Continued from page 7)

A fruit grower's Utopia would, of course, be free from insects. But since we have always had them with us, some as friends, and many more as enemies, we might as well make up our minds that the best defense against the unfriendly ones is a strong offensive. Just how many species of insects there are in the world is not known. Entomologists have attempted at different times to estimate the number of species. Their figures range from a probably much too conservative 2,000,000 to a possibly extravagant guess of 10,000,000. It is not of consequence to know the exact number of species in the whole insect world; but it is important for every grower to know intimately the personal habits and destructive activities of the pests which attack his particular fruits. He should keep informed, too, regarding the latest developments and most effective methods and materials for fighting these enemies. To help keep each reader posted on his pest problems is, of course, the purpose for publishing this annual Spray Number of AMERICAN FRUIT GROWER. In the pages of this issue will be found information of many kinds which will prove helpful in the planning and procedure for carrying out the right program at the right time and to the right end —the growing of better fruit. There is one important factor, a vital necessity to the success of any spray program, which can be provided only by the grower himself—and that is the *personal* element. Even though everything else be provided by science and modern invention, the battle against insect pests will not be—in fact, cannot be—won unless the "man behind the gun", spray gun though it be, is skillful, systematic and thorough. Staunch in his purpose and stout of heart, he must take his stand in orchard and field and with spray gun in hand, say of the insect invaders:

"They shall not pass!"

OUTSMART CODLING MOTH

(Continued from page 32)

ized boxes to be brought back into their orchards.

The thinning off of wormy fruits early in the season, while first brood worms are still in them, is often practiced with considerable benefit. The breaking of clusters is also of value in permitting more thorough coverage with spray material. Good spraying is also facilitated by proper pruning.

In so far as neglect in the practice of sanitary measures and other measures that do not involve spraying contribute to high codling moth infestations, we believe that these unusual populations have built up over a period of years, reaching an acute stage in the older orchards. We can reason from this that it may take a number of years to realize the full benefit of such control practices. If such is the case, the cost of clean-up methods should not be charged to production costs for the year the operation is put into effect but rather distributed over a period of years in the nature of an investment, since the maintenance costs will be far less than the initial expenses.

It is not necessarily recommended that all growers use all measures which might have an influence on the codling moth population. Obviously, if the worms in a given orchard are readily controllable with a reasonable spray program, and the residue loads are low enough to be easily removed, the need of other control measures is not especially urgent. This would be particularly true in regions having moderate worm infestations in orchards of large, old trees, the scraping of which in preparation for banding is expensive. On the other hand, a grower who is having difficulty in controlling worms by spraying, and who may be having even more difficulty in removing the residues safely below tolerances, should give careful consideration to all control measures and adopt those that are indicated for his conditions.

The need for a better balanced control program which we believe will permit a more reasonable spray program is reflected in the research programs of both the state and federal agencies. Experimental work is under way to obtain more exact information on the supplementary measures now recommended, and to develop them to a higher state of effectiveness. Intensive research is also under way with other measures that do not involve spraying, such as baits, lights, repellents and parasites, which have not yet reached a state of development to permit recommending them for practical use.

THE QUETTA NECTARINE

(Continued from page 37)

acreages as far south as the San Joaquin Valley have been set out since until at the present time there are over 400 acres of the Quetta nectarine growing in California, a large part of which is in bearing. As soon as these newly planted acreages began to bear, carload shipments were made to various markets, a crucial test for any new variety, for at this point it ceases to draw novelty prices and must stand or fall on its own merits as a first-class dessert fruit. The first large shipments in 1931 were sent to Los Angeles in lug boxes and grossed $90 a ton. The following year carload shipments were sent East and the grower received $50 a ton net, in spite of the fact that returns on other fruits were very much lower than usual. In 1933, the writer noticed that the Quetta was for sale at practically all the better-class fruit stores in Washington, D.C., and in some instances was a part of the stock of the roadside stand. Some of the growers were using a filler container pack; others, the usual one, but fruits seemed to have carried equally well regardless of the method of packing and were retailing at three and one-half cents apiece even though they were being sold on the market in competition with North Carolina and Maryland peaches.

During the last two or three years the canning companies have been experimenting with the Quetta. In 1934 two companies canned them apparently with good results, for their buyers offered $35 a ton for last year's crop, a price considerably higher than that usually offered for cling peaches for canning purposes, and it is estimated that several hundred tons were canned. This difference in price tends to offset the heavier yielding qualities of cling peaches.

Each year the bearing acreage has increased and greater numbers of carloads have been shipped to market. In 1934 one California grower raised and shipped approximately 79,000 boxes and, although he lost some of the fruit when brown rot developed in transit, he received excellent returns on that which arrived in good condition. Others produced good crops and received good returns for their fruit, and at a time when prices for other fruits were still below par. If the acreage increases and the marketable crop becomes larger, returns to the grower will be commensurately lower. However, its commercial expansion depends to a large extent on the elimination or control of certain limiting factors, but at the present time the Quetta nectarine has demonstrated beyond any doubt its value as a fruit for commercial planting in certain parts of California.

In California the commercial planting extends from around Vina, in the northern part of the state, southward to and including parts of the San Joaquin Valley. Thrips, which is one of the major insect problems in the production of prunes, pears, onion, gladioli and roses, and to a lesser degree with apples, attacks the flowers and fruits of the Quetta nectarine, reducing the crop and injuring many of the nectarines so that their quality is lowered considerably when they mature. Thrips have caused considerable damage to the Quetta orchards in the San Joaquin Valley and in sections farther south have been so bad that growers have given up attempts to grow the crop. As yet, no satisfactory method of control has been developed. The orchards in the Sacramento Valley have had only light infestation of the thrips thus far, and it is from this area that the best Quettas are coming.

Last year growers suffered heavy losses from brown rot disease which developed on the fruit just prior to harvest and while in transit. Regardless of whether grown commercially or in the home orchard, this variety will require a careful spray program to control brown rot as well as curculio and other factors which contribute to it. Equal care must be exercised in handling the fruit from tree to refrigerator car if loss of fruit from this disease is to be kept at a minimum.

East of the Rocky Mountains the plum curculio has always been somewhat of a handicap in attempts to grow nectarines, for that insect has a preference for smooth-skin fruits, but the damage from this insect can be checked fairly well if the control measures worked out by the entomologists are carried out.

Many of our horticultural plant introductions are of indirect value only, i.e., when combined with our well established varieties they contribute some inherent quality such as disease resistance, hardiness, etc., and materially aid our plant breeders in their efforts to develop varieties more suitable for certain of our horticultural areas. Occasionally a newly introduced variety of fruit, vegetable or flower, when tested in America is meritorious enough in itself and soon becomes established in those sections where it finds an environment suitable for its development. The Methley plum from Natal, South Africa, now widely grown in Texas and some of the other southern states, is an example and the Quetta is another, the future development of which will be interesting to watch.

Kentucky and Illinois Nut Growers Hold Meetings

STIMULATED in part by the recent meeting of the Northern Nut Growers Association held in Rockport, Ind., considerable interest in nut culture has developed in southern Indiana and adjoining Illinois and Kentucky. In these regions are large numbers of native pecans, hickories and walnuts. Many of the prize-winning pecans in the 1934 prize nut contest of the association were discovered in this section.

J. F. Wilkinson, nut tree nurseryman, of Rockport, Ind., and a skillful propagator of nut trees, has had much to do with developing the possibilities in nut culture in this region. He has grown them successfully, discussed their care and propagation, searched out superior varieties in the wild and judged at various nut shows.

On November 19 H. C. Neville, an Illinois county agent, sponsored a nut meeting and exhibit at New Haven, Ill., with an attendance of more than 75 persons and many exhibits. Mr. Neville was responsible for bringing to light many of the prize-winning pecans in the 1934 contest, in fact, two of the five prize-winning pecans and eight of the 14 receiving honorable mention were from New Haven.

The first Annual Southwestern Kentucky Nut Show was held at Bordwell, Ky., on November 21, with a large attendance and many exhibits. Prof. W. W. Magill, field agent in horticulture for the University of Kentucky, with a group of county agents and farmers, sponsored the meeting. Prizes were awarded for the best samples of native pecans, hickories and walnuts. In this region are thousands of acres of native pecan groves, which indicates that the region has possibilities for the development of a pecan industry. Speakers included Hardin Graves, J. F. Wilkinson, John W. Hershey and W. W. Magill.

On December 5 a special evening meeting of the Kentucky State Horticultural Society was devoted to nut culture, with an exhibit and discussion of nut growing by J. F. Wilkinson, John W. Hershey, N. R. Elliott and Harry R. Weber. Prof. Magill deserves much credit for his efforts to develop the nut cultural possibilities of Kentucky.

One of the objects of the Northern Nut Growers Association is the development of interest in nut culture in those parts of the northern states which are adapted to nut growing. The association will assist, when possible, through interested members similar meetings in other sections of the country. Information regarding other local meetings in the northern half of this country and Canada will be appreciated by the secretary.

It has been decided to hold the 1936 meeting of the association on September 14 and 15 at Geneva, N. Y., with a field trip to Ithaca on September 16. These dates precede the annual meeting of the New York State Fruit Testing Association, which will be held September 17.

G. L. SLATE, *Sec'y*,
Northern Nut Growers Association,
Geneva, N. Y.

Hon. Peter G. Ten Eyck, commissioner of the New York State Department of Agriculture and Markets, spoke at the New York meeting on the work of his department as pertaining to fruit growers of the state. Among the points that he brought out were that importations would be protected so as to prevent the introduction of new pests to the New York fruit sections, that growers should decide on standard-sized apples for tolerance tests, that the department will continue to give aid to scientists working on a substitute for arsenate of lead for codling moth control and that the department would seek to improve the package standardization law.

HISTORY OF NICOTINE SPRAYS

(Continued from page 14)

pot-shots at the enemy with hand syringes, the "mixture" upon which they depended was "two handfuls of finely powdered 'bad' tobacco in two liters of water in which lime had been slaked." Having crawled up and down their trees, like human measuring worms, and carefully syringed them with their haphazard mixtures, these patient eighteenth century workers waited (perhaps, rested) four or five days and then carefully syringed the trees again, this time using clear water. Apparently the extension services of those "good old days" did not even consist of a double-section ladder.

Another practice in France during this same period was to control plant lice by passing the leaves on which they were found between two sponges wet with tobacco water. The use of ground tobacco powder, spread on the leaves, was also advocated.

Later, in the early 1800's, William Cobbett, in his book, "The English Gardener," stated that the woolly aphis could be destroyed by washing the plants with something strong, such as tobacco juice.

The early history of this important insecticide is dotted with instances of use in the United States and for the past several years it has been one of the standard insecticides available in the pure form or combined as nicotine sulphate. Of its many uses, one of the important is in the control of the apple leaf hopper.

While speaking before the annual meeting of the Illinois State Horticultural Society, Prof. W. P. Flint of the Illinois State Natural History Survey Division and Agricultural Experiment Station said that where the leaf hopper is present to such an extent that there are 50 or more nymphs to 100 leaves, it is best to spray. There is usually a good hatch by the seventh day spray after calyx and the 40 per cent nicotine should be used at the rate of three-fourths pint to 100 gallons of spray. This same concentration should be used if the leaf hoppers are present at the time of the 16-day after calyx spray.

Spraying is recommended only when the leaf hoppers are in the nymph stage, as they are able to fly during the adult stage, which comes later in the summer and may escape the effect of the spray.

When the leaf hoppers are present on a tree, the foliage becomes pale in color and there are tiny specks of greenish white showing through from the under surface of the leaves. The margins of the leaves are often burned, the leaves, and especially the new growth, are curled and the fruit is dotted with specks of excrement given off by the insects. Severely injured leaves fall from the tree.

The key to successful control lies in spraying while the insect is in the nymph stage before it has a chance to bring about any of the above symptoms. The principal species of leaf hopper which attacks the apple spends the winter as a mature insect among leaves on the ground or under any trash, among dense grass, weeds or like shelter. They become active early in the spring, when they fly about and mate before the buds are green. When the leaves appear, the insects lay their eggs by pushing them into the larger veins or stems of the leaves. The eggs hatch into the first generation nymphs when the leaves become full grown or shortly after. The nymphs and the adults feed on the leaves.

In order to recognize the nymphs and thus determine the presence of the leaf hoppers and the advisability of spraying, it is well to know their characteristics. The nymphs are pale green to greenish white in color. They are without wings but are extremely active. One peculiar trait of these tiny pests is that they are able to run forward, backward and sideways with ease. They are about one-eighth inch long by one-fourth as broad and because of their color they may sometimes be difficult to see on the tree. If there is no soap in the spray solution to which the nicotine is added as mentioned above, it is advised that one pound of soap be added to and dissolved in each 25 gallons of the spray solution.

Summer oils and nicotine have been excellent as control for the second brood of codling moth. According to Prof. Flint, the best combination for this purpose is one-half to three-fourths per cent oil and one pint of nicotine to 100 gallons of water.

When the nicotine-oil combination is used, it is important not to use Bordeaux mixture in the same spray, as the Bordeaux will cause a too-rapid release of the nicotine, resulting in poor control.

In the East, research workers have found that bentonite sulphur combined with nicotine has given excellent results for codling moth control. Bentonite sulphur is a compound made by fusing bentonite with sulphur at the melting point of sulphur. Eastern workers have recommended that six pounds of bentonite sulphur be used to the point where scab is controlled and then changed over to four and one-half pounds so as to prevent visible residues at harvest. This is to be used with nicotine and a spreader for good codling moth control after the use of lead arsenate up to the third cover spray. This practice will lessen the residue load.

FATHERS AND SONS

E. Stuart Hubbard, grower and commission dealer of Poughkeepsie and New York City, and his son, E. Stuart, Jr., check over their notes on the program of the New York State Horticultural Society meeting at Rochester. Mr. Hubbard was one of the founders of the New England Apple Institute.

H. J. Lindhurst, center, grower near Lewiston, N. Y., and his son A. H., right, pause for a chat with Dr. J. G. Sanders in front of the exhibit hall at the New York State Society meeting. The Lindhursts operate 200 acres of fruit.

Among the early arrivals at the New York State Horticultural Society meeting at Edgerton Park in Rochester were W. E. Musser, right, and his son, Arthur. Mr. Musser operates two 50-acre orchards near New Bethlehem, Pa. He is also a member of the Pennsylvania society.

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FOR PRICES OF TREE BANDS AND GRAFTING Wax in small or large quantities write EDWIN H. HOUSE, Saugatuck, Michigan.

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COWL TREE SCRAPER. THREE-EDGE STEEL blade curved to fit tree and limb. Quickly prepares trees for bands. Price $1.45 delivered. FRUIT PACKING EQUIPMENT COMPANY, Swoope, Virginia.

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WIND ELECTRIC PLANT

BUILD SLOW SPEED WIND CHARGER FROM AUTOmobile generator. Plans 10c, with 20 other generator changes. LeJAY MANUFACTURING, Minneapolis, Minnesota.

SPRAY SERVICE

(Continued from page 31)

ers, county agents or others who have had experience in observing the development of the tree.

Each week these men send reports on the development of the buds to Dr. Pierstorff by telegraph or telephone. The reports are sent three times a week except where the observer feels that information should reach Dr. Pierstorff earlier than the regular day. During the past season there were more than 35 observers in the field who reported at the regular intervals.

In addition to the men who observe the bud development, there is another group in the field who collect leaves in the fall, and then three times each week during the spring a few of these leaves are sent to Dr. Pierstorff. Franked envelopes are furnished for mailing the leaves. The leaves are kept throughout the winter under natural conditions. From these leaves Dr. Pierstorff is able to determine the development of the scab fungus, and with the correlation of the bud development reports and the development of the fungus he is able to give spray advice for the various sections.

The work of these men in the field is the fundamental requisite for the operation of the service in order to give accurate advice for all of the sections of the state. Each day Dr. Pierstorff receives a special message from the weather bureau in Washington and also direct news from the weather bureaus of the various cities about the state. The determination of rain in the various sections is of extreme importance for the control of scab.

From the reports of the field men and the weather bureaus, Dr. Pierstorff prepares a talk for the growers in each of the two major fruit belts. One talk is sent by direct wire to the studio of station WLW. Here the talk is read by the county agricultural agent. The same procedure is followed at station WTAM in Cleveland with the other talk.

The broadcasts are made from March 25 to June 20 from the material prepared by Dr. Pierstorff, and the program appears from three to five times a week according to the demand.

Co-operating with Dr. Pierstorff on this project is T. H. Parks, extension entomologist, who prepares the material on sprays for insects. After June 20 the work is under the direction of Parks, who continues the broadcasts until July 1.

Approximately three years ago O. C. Boyd of Connecticut inaugurated a similar radio spray service as that used by Ohio and it has given equally as good results in that state.

CONTROLLING CITRUS PESTS

(Continued from page 11)

attention has been given to spraying, which is now the most widely used method of control.

The sprays are of two types, oil sprays and non-oil sprays. The latter are comparatively inconsequential, although within the past year or two certain non-oil products have shown considerable merit. Highly-refined petroleum oil spray, otherwise known as the summer type of oil spray, is used exclusively. The oils range from 90 to 99 per cent in unsulphonatable residue or saturated hydrocarbons. They range in heaviness from the light or No. 1 grade, which may be considered an extra heavy kerosene, to the heavy or No. 5 grade, which is a light lubricating oil. In all, five grades of oil, each with a specific distillation range, have been used under different conditions and in different districts for the control of the various insects. To safeguard against injurious effects, the endeavor is made to use the lightest oil that will give a reasonably effective control of the insect for which the spray is applied.

Three types of oil spray are in use: oil emulsions, emulsive oils otherwise known as soluble oils, and tank mix oils. The oil emulsions are of the paste type, containing about 83 per cent oil and 17 per cent water and emulsifier. The popularity of the emulsions has waned very greatly during the past two years, while there has occurred a corresponding increase in popularity of the emulsive oils. The latter are approximately 98 per cent highly-refined spray oil and two per cent oil-soluble emulsifying substance. When mixed with a small amount of water and forced through the spray pump there is formed an emulsion that is rather unstable and requires effective agitation to keep it uniformly mixed with the water when the tank is full. Tank mix oil is the highly-refined oil, without treatment or added ingredients, just as it is produced at the refinery, the same as is used in making the numerous proprietary emulsions and soluble oil products. It is used in "tank mix" spray, a so-called home-made spray developed by the University of California for the growers who desire to use a spray of known composition. The required amounts of oil and blood albumin spreader are placed in the water in the spray tank, and a uniform mixture is produced by agitators that are run at a high speed or by large agitators that are run at normal speed.

A good sized orange tree will bear 100,000 leaves. The problem of the sprayman is to effect a covering of oil on the dorsal and ventral surfaces of every leaf. To accomplish this he uses a spray gun equipped with a discharge orifice 7/64 or 8/64-inch in diameter which delivers five to seven gallons of spray per minute at a pressure of 450 to 500 pounds. From 20 to 30 gallons of spray are applied to the tree. Drenching quantities of spray must be applied if anything like a complete coverage of the leaves and fruit is to be attained. Every spray outfit is equipped with a tower which carries a sprayman who sprays the top portions of the trees.

Formerly a considerable element of risk of injury was involved in the use of oil sprays. With the standardization of spray oils, the improvement in oil spray products, the better understanding of the reaction of trees to oil spray, and additional knowledge of how to safeguard against objectional reactions, the element of injury has been greatly decreased. However, the margin between effective control on the one hand and injury to the tree on the other is still relatively narrow. Occasionally the application of oil spray is followed by the excessive dropping of fruit and leaves and by various other injurious effects that are more or less obscure in nature.

In every district there is an agricultural inspector, employed on a regular salary the year round and paid by the county, whose duty is to see that spraying and fumigation treatments are properly made and to see that growers do not let their orchards become infested to such an extent that they become a menace to surrounding orchards. Pest control, therefore, is regarded an obligation to the community and the citrus industry.

SUCCESSFUL ORCHARDS

● A "ROUND TABLE" PAGE FOR EVERY GROWER ●

This page is a place for growers to get together and exchange experiences and ideas. The beginner, as well as the veteran, will find here many practical suggestions for better and more profitable fruit growing. In return for the helps you receive from this page, be ready to pass on, for the benefit of others, any new idea, method or procedure you have developed or run across. Just jot it down as it occurs to you (a postcard will often do) and mail it to the "ROUND TABLE EDITOR," AMERICAN FRUIT GROWER. Don't worry about fancy writing. What the readers of this page want are practical pointers—that are to the point.

PRUNING POINTERS THAT PROTECT YOUR PROFITS

NOTHING is more important than proper pruning, therefore nothing is more costly than poor pruning. Nobody knows this any better apparently than V. M. Couch of Ithaca, N.Y. He offers the following advice because he doesn't want other growers to make the same mistakes he did.

"You have to know on what kind of wood the fruit of various trees is produced before you can do good pruning," he says. "I tried to prune all of my trees in the same way and when I trimmed the apples as I did the peaches I lost a lot of fruit the following season. When I cut off the fruit spurs from the apples there was no crop and then I found out that when I trimmed out only the dead branches and cut out the heads there was a good crop. This left the short fruit spurs on the tree.

"Another thing I've found out about trimming an apple tree is to cut out the top so as to let in plenty of light and air. This helps to keep the tree healthy. I have followed the plan started in Michigan of cutting out all of the weak undersized wood and find that it works fine."

TEST WASHINGS PROVE TOLERANCE INSURANCE

"LOOK before you leap" is a time-worn adage that can be applied profitably to the problem of washing to meet tolerance requirements. Clarence T. Smith, of Flora, Ill., points out that test washings are not costly and save time and money by proving the effectiveness of the washing solution before it is too late.

"Last summer and fall," he says, "just before a lot of fruit was to be picked we went into the orchard and picked a few bushels. These were run through the washer with the solution kept at a certain strength. Then samples of these were sent to the state laboratories for tolerance tests. If they were under the tolerance we knew that we could use the same strength solution on the entire run and be practically sure of the results.

"These preliminary tests are not costly to make and they are almost an insurance when washing the entire run later on."

Another worth while precaution is to take frequent readings of the solution strength during the washing process. Some of the acid is removed by the fruit and unless the supply is replenished the solution will be weakened. When thinking of the washing problem it is well to consider the water supply as the U.S.D.A. recommends that two to four gallons of water be used per bushel to rinse the fruit.

STRAWBERRY MULCH MYSTERY EXPLAINED

THIS may sound like a "mystery thriller" but it goes to prove that science is a mighty good "silent partner" in any fruit growing venture. Overwintering mulch for strawberries is beneficial. Straw has proved best, but other materials frequently are tried, sometimes with disastrous results. Let C. E. Richards of Brice, Ohio, tell what happened in his case.

"I've been using straw as a mulch on my strawberries for a good many years," he says. "My strawberries are irrigated and I usually get a good crop. I grow Premiers, but have planted a few of the newer varieties like Dorsett and Fairfax.

"Well, I thought I'd try something else for a mulch so I went to a wagon shop in town and hauled several truckloads of sawdust and shavings to my place. I put this on the patch in the late fall just as I'd been used to doing with the straw.

"The sawdust and shavings made a dandy cover but the next spring the plants were a sickly looking green and set a good number of fruit, but didn't have a good crop. I didn't put the sawdust and shavings on a little plot in the patch where I had put some new plants and these were healthy. This cured me of sawdust and shavings for a mulch and I'm going to stick to straw or hay from now on."

Here is how science explains the trouble experienced by Mr. Richards. The cellulose in the sawdust and shavings attracted the tiny microbes in the soil. These small organisms take nitrogen from the air and make it into a form so that the plant is able to take it in through the roots. If the organisms feed on the cellulose in the sawdust and shavings they will not provide nitrogen for the plants. The plants "starve" for lack of nitrogen.

Strawberry mulching also helps to prevent the splashing of dirt on the fruit during late spring rains. The muddy appearance of the fruit cuts its market value.

"FACIALS" THAT HELP TO SELL APPLES

NOBODY questions the fact that apples with good complexions sell better than those with poor skins. And an apple that can't boast of a skin you'd love to touch has very little chance of winning an award at any one of the shows.

Growers spend much time and energy in preparing fruit for exhibits and shows, but a southern Ohio orchardist reports a method of easily giving his apples "facials" which make them well nigh irresistible. He is C. E. Drumheller of Buena Vista, Ohio, and he describes his process as follows:

"When my fruit comes from the trees it is the same as any grower produces, but I ran across a way to give the apples a better gloss for show purposes and also for display purposes on the trucks from which I sell along the roads. I take a bar of stearic acid, which is also known as hard-oil tallow and is a by-product of candle manufacturing, and with a clean cloth rub it on the fruit. I then take another cloth and rub the stearic acid off leaving the apples with a bright, glossy skin. The stearic acid comes in a cake. It is white in color, a vegetable compound and because of its purity, causes no damage to the fruit. In fact, I have found that with this material on the fruit it holds up better on display. I believe this application helps to conserve the moisture in the fruit, taking the place of the natural wax removed by washing. We do not have a cleaner, but it is reasonable to believe that a little of this material on the rags would shine up the fruit as it goes through the cleaner."

"GANGING UP" ON PECAN GIRDLERS

"ONE for all, and all for one" was the slogan adopted by Georgia growers in a recent campaign against "pecan girdlers." This co-operative clean-up campaign to rid the district of this troublesome insect pest took place near Orangeville, Ga., and a report of it is passed on by C. F. Watson for the benefit of others.

"Pecan tree girdlers were pretty bad in this part of the country last fall," writes Mr. Watson, "and some of the growers got together and worked out a plan which gave good results and which might be helpful to growers in other sections.

"We were advised by specialists at State College that the female girdlers gnaw around the twigs and then lay their eggs in the bark. Later these twigs drop off the trees and provide a place for the eggs to hatch and the grubs to develop. Removing the fallen twigs will prevent reproduction of the pest we were advised.

"We got busy and started a clean-up campaign to get rid of these twigs in which there were eggs. It worked in good shape and we are sure the results will compensate for the extra work. The females of this pest are the ones that girdle the twigs, but both the females and males feed on the tender bark at the tips of the branches. Because of this they might become serious if allowed to multiply in large numbers."

Orchard sanitation can be followed to aid in the control of many orchard and grove insects. Debris about the orchard provides a place for overwintering of the pests. This means of existence for the pests may be removed by a little extra effort which will prove profitable in the long run.

FOUR years ago, BEAN introduced the tapered valve seat which requires no gasket. After 4 years of field use there is no question about its success.

With the clamp style valve cover which we have always used there are no threads in any of the valve parts to corrode in.

WATCH THE FULL-ARMORED BEAN 'ROYAL' IN *action*

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Factories east and west and authorized BEAN *dealers in every growing section insure good service to* BEAN *owners everywhere.*

Follow one of these compact, stream-lined, low-slung outfits through the orchard. See for yourself what it does on the job.

Watch how easily it handles . . . in and out among the trees, under low-hanging branches & on side hills. Watch the gauge if you want proof of steady, dependable, high pressure. See how the outfiit drives the spray in a drenching fog, through and through the trees, saturating every part with the spray solution.

Note how the men give all their time to the spraying and not to the sprayer. There's little to do with a BEAN but to start it and stop it & to re-fill the tank when it's empty.

Its outstanding performance is the result of outstanding design and construction. Powered with the famous All-Enclosed BEAN Oil-Bath 'Royal' Pump . . . equipped throughout with friction-less ball and roller bearings . . . all metal from end to end, including all-steel tank, proofed against corrosion. From end to end, the BEAN is built for long, hard, trouble-free, low-cost service. Offered in a range of sizes . . . dust-proof roller-bearing steel wheels, pneumatic tires, or without wheels for mounting on your own truck.

BEAN FULL-ARMORED 'ROYAL' SPRAYERS

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MICROSCOPIC FINENESS

The perfection of Dow "Mike" Sulfur marks one of the most valuable contributions to fungicide control so far accomplished.

Produced by a totally new and exclusive Dow process, "Mike" Sulfur is far superior in every way to any wettable sulfur previously available.

While this new sulfur is fifteen times finer than ordinary 325 mesh sulfur, the important point is that this fineness is *uniform*. The particle size is approximately 5 microns in diameter (5 thousandths of an inch)—sufficiently fine to assure quick release of the sulfur vapors. Sulfurs formerly considered superfine contained particles as large as 70 microns!

Secondly, "Mike" Sulfur is 95 per cent *active* sulfur. Quite obviously, it is the *sulfur* that does the job—the higher the sulfur content the more effective the spray.

And, "Mike" Sulfur goes into suspension instantly—even without the aid of an agitator.

Moreover, its adhesive quality is far superior to all ordinary sulfurs.

Finally, Dow "Mike" Sulfur will not deteriorate with age. It remains free-flowing for an indefinite period.

Consider what these advantages mean in actual use. Its greater fineness produces a fog-like spray that blankets fruit and foliage—penetrating peach fuzz and providing positive protection.

The high sulfur content gives a toxicity far greater than formerly obtained and the marked gain in adhesion lengthens the effectiveness of each application.

Beyond question, "Mike" Sulfur heralds a new high in crop productivity. For it is not only a more effective combatant against brown rot, apple scab and other profit-destroying conditions but offers this protection at far less cost due to its positive and lasting coverage.

Investigate Dow "Mike" Sulfur. See for yourself how it works and harvest a crop that will repay you over and over again in its perfection and profit.

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